

RAILROAD GAZETTE

A Journal of Transportation, Engineering and Railroad News.

QUARTO VOL. II.—No. 19.
Fourteenth Year.

CHICAGO, SATURDAY, FEBRUARY 4, 1871.

\$4.00 PER ANNUM,
In Advance.

Contributions.

THE MILLER PLATFORM.

The Board of Railroad Commissioners of Massachusetts, in their late report, say:

"The improvement known as the 'Miller Platform' was favorably adverted to in the first report of this board, and it effectually precludes all danger of passengers falling between cars while passing from one to another. It has been very extensively adopted in the Western and Middle States, though hardly at all in New England. Not only does it greatly contribute to the comfort of all traveling, by effectually putting a stop to unsteady motion, and especially to jerking, both in stopping and starting trains, but it is in two respects a great safeguard against the worst accidents to which railroad travel is subjected. It prevents what is called 'telescoping,' and, being a self-coupler, disconnects in case one car, in rolling down an embankment, threatens to draw the rest of a train after it. This is a patent invention, and the commissioners do not see how its use can be made compulsory; indeed, it is not impossible that practical difficulties may exist in its use upon roads with very sharp curvatures. The Commissioners must, therefore, content themselves with again, in this connection, calling attention to it, and repeating, as earnestly as they can, the recommendation contained in their previous report."

In reply to this, Mr. Miller has written a letter—accompanied by a drawing, which we reproduce—to the commissioners, in which he says: "The sharper the curve is, the surer will be the coupling of my automatic arrangement. On the second page of the letter-sheet is a cut (this cut can be seen in his advertisement on another page), in which A shows the location of the coupling hook and stop, and C that of the stop, which is a part of the coupling device. It is the philosophy of the construction of this plan of coupling which I wish to make you acquainted with. In the diagram of the coupling hook and stop, the line marked a, b, is the longitudinal center line of the car, which, for convenience, I will call the 'draft-line'; b is the rear end of the coupling hook; c the joint; d the stirrup, or 'yoke' of the hook; g the back of the hook; f the point of the hook, and f, g, the face of the hook."

"The line of the face, you will perceive, is not rectangular to the 'draft-line' a, b, but acute-angular thereto. The exact value of this angle is obtained in this way, viz.: The usual curvature of rails is from 0° to 10°. It is desirable, for the sake of convenience in uncoupling cars, to make this acute angle as slight as possible, and yet not so obtuse to the line of draft of the next car, L, when on a curve, as to cause or permit uncoupling. So I take 10°, m to L, as the maximum, and draw said 'face-line' at right angles with said line of draft, L, of said annexed car on said maximum curve, and call this my standard 'face-line,' though there are occasionally sharper curves to traverse."

"The 'stop,' A, forms an equally important part in the plan of making an automatic and safe coupling. The point marked i is another locality for the same stop. This is set just far enough from the point of the hook to leave a space exactly one inch less than the width of the hook head—the former 7, the latter 8 inches. Through this space each hook must pass in coupling, the space being enlarged, for that purpose, by the pressure of the beveled sides of the hooks, in the act of closing together for the purpose of coupling, and when the coupling is completed (the springs having crowded the hooks together), the space is restored to 7 inches."

"In equipping cars for use on extra sharp curves, all I

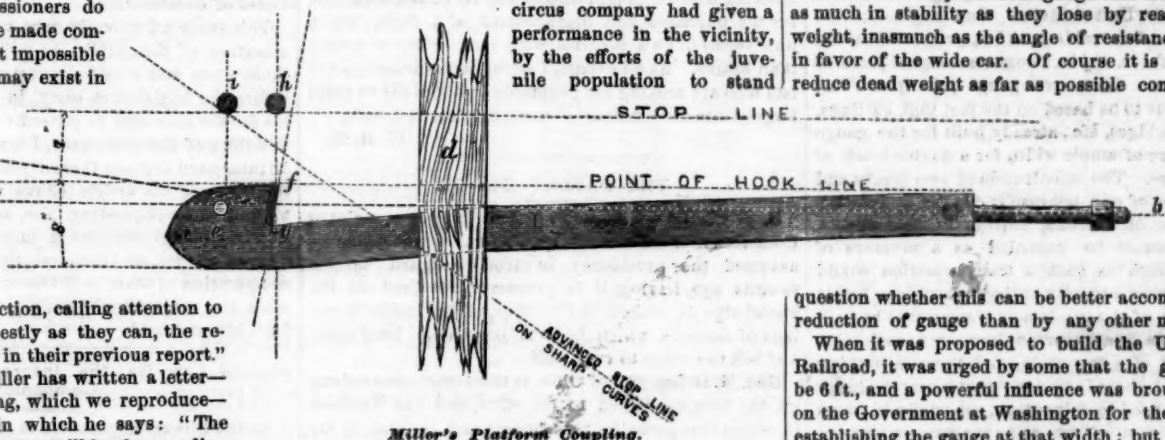
have to do to render the coupling safe is to advance the stop towards the front, i, e, towards the other car. To show plainly what this change of location of the 'stop' A will do, I have located it at i; while the location of the stop at A permitted the cars to move on curves without materially diminishing the space between the point of the hook f and the stop A, its removal to i causes, as shown by the line—which I call the advanced stop-line—a reduction of that space about one-half, or to 3½ inches."

"Of course the diagram shows an exaggerated plan, but I do this to make the theory plain. For a curve of 100 feet radius I advance the stop 1½ inches. This, I find by experience, is sufficient, and it does not materially interfere with uncoupling on lines on ordinary curves. So you see the question of reliability on sharp curves is settled, theoretically and practically."

E. MILLER, No. 331 Broadway, New York.

THE NARROW-GAUGE MANIA.

Who has not been amused for days and weeks after a circus company had given a performance in the vicinity, by the efforts of the juvenile population to stand



on their heads, or their attempts at equestrian performances, ground and lofty tumbling, etc. or who, after Blondin's feat at Niagara, did not notice a disposition of all mankind—boy-kind, at least—to walk on fences, clothes-lines, telegraph wire, or on anything except terra firma? And did you, reader, ever, on any occasion, pick yourself out of the mud with shoulder dislocated, pants torn, and your best hat resembling a cold pancake, the result of your efforts to master the velocipede? If you have, there is nothing particularly wonderful about it, as we are all, more or less, prone to indulge in such *pleasantries* (or, if you like it better, nonsense) for the sake of amusement."

So far as amusement, this is all well enough for those who can afford it; but we sometimes see men, who are adjudged sound and solid, taking a practical view of these matters, and this is what excites our wonder. That certain excitable people, who are to be found in every community, should attempt to make money by standing on their heads, is not surprising; but when the sound ones undertake it, we think excitement is getting the better of their judgment."

The velocipede mania disturbed the equilibrium of thousands of stable men (not livery-keepers), and now that the bicycle is seen no more in our streets, the minds of the people are absorbed in solving the problem of the narrow-gauge railroad."

Of course it is not likely that the narrow-gauge mania will share the fate of the velocipede excitement, as there is a probability that the narrow-gauge system will be adopted in some localities; but that it will ever come up to the expectations of its advocates is exceedingly improbable. The discussions now going on among engineers, both in this country and abroad, in regard to this question, are awakening a good deal of interest throughout the civilized world, and although the advocates of the narrow-gauge claim to have made some strong points in its favor, it is doubtful whether some of the theories advanced by them will be substan-

tiated by practice. In regard to the carrying capacity of the narrow-gauge roads, as compared to those of 4 ft. 8½ in. gauge, their comparisons seem to be correct, and if there were no other considerations at stake, the present system would lose a strong point; but when we consider that the carrying capacity of some of our wide-gauge roads is inadequate to the transportation of goods on a single track, and that some of our double-track roads are taxed to their utmost to keep these roads clear of freight, the idea presents itself that the narrow gauge is not adapted to the wants of the community. For instance, the practice of narrow-gauge roads thus far has been mainly to carry only that class of freight which would occupy only a portion of the floor space in our ordinary wide-gauge cars in carrying a maximum load; consequently a wide-gauge road carrying largely of that class of freight, would be laboring under a disadvantage, if we accept their proposition that the unnecessary floor space increases the proportion of dead weight to paying load. It is difficult, however, notwithstanding their array of figures, to understand why the wide-gauge cars would not gain as much in stability as they lose by reason of dead weight, inasmuch as the angle of resistance would be in favor of the wide car. Of course it is desirable to reduce dead weight as far as possible consistent with speed and safety, and a proper regard for the carrying capacity, and here arises the

question whether this can be better accomplished by a reduction of gauge than by any other method."

When it was proposed to build the Union Pacific Railroad, it was urged by some that the gauge should be 6 ft., and a powerful influence was brought to bear on the Government at Washington for the purpose of establishing the gauge at that width; but the officials having charge of the enterprise decided, after consulting the best authority on the subject, that 4 ft. 8½ in. was preferable in all respects to the 6-ft. gauge, and accordingly established that as the width of the road. There are those who argue that as this decision was made after mature consideration and concurred in by the best engineering authority in the country, that the decision favors the adoption of the new proposed narrow-gauge system, and that the reason why a narrower gauge was not adopted at the time was that 4 ft. 8½ in. was the standard gauge of the country, and that that gauge was adopted for the sake of uniformity. It may be fair then to ask why the standard gauge of the country was not narrower than 4 ft. 8½ in.? An answer to this may be found in the fact that, after an experience of thirty-five years in the building and operation of over forty thousand miles of road, it had not been discovered that the cars or track were any wider than was actually necessary for all purposes of transportation. On the contrary, the carrying capacity of both freight and passenger cars have been steadily increased to meet the requirements of the railroad community and the public at large. It has been demonstrated, however, that a track of 4 ft. 8½ in. gauge is wide enough for all practical purposes, although an addition of ¾ inches would be considered an advantage by some engineers for its convenience in locomotive building. The practice with 6-ft. gauge roads in this country has not shown any advantage over the 4 ft. 8½ in., and in fact those who a few years since were such warm advocates of the broad-gauge, have settled down to the opinion that 4 ft. 8½ in. is wide enough, and that the extra expense of operating the 6-ft. gauge is not compensated for by any convenience arising from it; but it does not follow that because those who formerly favored the broad-gauge (6 ft.) now prefer the 4 ft. 8½ in., a further reduction is advisable. If that were the case, then we might come down to the single rail, or still further, to a single wire. Blondin

did a great business on a single wire, and although he did not run a palace car at Niagara, he took his hotel accommodations with him, dined on the way, and made quite a comfortable trip. He took a passenger also, who might have crossed a short distance down the river in a car on a gauge of 4 ft. 8½ in. with perfect safety. The narrow-gauge men may argue that he took Biondin's route because he preferred it, which in one sense he probably did; but it could not have been on account of speed, safety or comfort. At all events the route was not patronized extensively, but although the line was soon abandoned, no doubt its projector realized all he anticipated. His receipts, however, were not from freight or passengers actually carried, which will no doubt be the case with some of the proposed narrow-gauge railroads; the *narrow-gauge* may do well for a time, but those who *pay* will be likely to be forcibly reminded of Franklin and his whistle. If it is designed to build a railroad for *business*, it is necessary that it be so constructed as to answer the purpose, *i. e.*, to carry passengers and all kinds of freight offered for transportation. Now how would these narrow-gauge lines manage to supply New York, Boston, Philadelphia, or any of our large cities with their weekly supply of live-stock? Of course something could be done in the way of shipping slate, coal, iron and freight of that nature on a narrow-gauge railroad, but how about the more bulky kinds, such as hay, grain, heavy machinery, lumber, etc.? Some engineers predict that the narrow gauge is destined to work a revolution in the present (what they term) broad-gauge system; that that the narrow-gauge (2 or 3 ft.) will soon take the place of the 4 ft. 8½ in. throughout the country. This idea I regard as absurd, and any engineer who has any regard for his professional reputation, is certainly taking a bold stand when he makes the unqualified assertion, that the narrow gauge will soon take the place of the 50,000 miles of wide-gauge road now in operation in the United States. One engineer, who certainly holds an honorable position, proposes that the present gauge of 4 ft. 8½ in. (single track) give place to a double track on the narrow-gauge principle. This proposition seems to be based on the fact that cuttings, embankments, bridges, etc., already built for the gauge of 4 ft. 8½ in. are of ample width for a double track of the narrow gauge. The substitution of two tracks and two cars in place of one, because it can be done without the expense of widening cuttings, embankments, bridges, etc., cannot be regarded as a measure of economy, inasmuch as such a transformation would render the carrying capacity entirely worthless for at least 75 per cent. of the goods now transported by rail. If there is a slate quarry, or an iron or a coal mine near the summit of a mountain, and there is nothing else to be carried, there is no doubt that a narrow-gauge railroad may be used to advantage, especially in cases where the products of the mine or quarry can be delivered at its final destination without transshipment. But it should be remembered by these advocates of the narrow-gauge system that we have cars built especially adapted to the wants of the trade for which they are designed. Look at our coal cars for instance: Where would be the economy in reducing their size to one-third or one-half their present dimensions, when the load they will carry must be correspondingly reduced? Then we have cars built especially for carrying lumber, marble, granite, heavy machinery, live stock, etc., and it is often necessary to load these cars to the extent of their capacity. Go into the marble and granite quarries of New England and witness the manner in which blocks of either of these, weighing ten, twelve or fifteen tons or more, are loaded on cars, and the apparent ease with which they are transported, and then tell us how this can be accomplished on a gauge of two feet. But it is unnecessary to give a list of the different classes of freight that it would be impossible to move on the proposed narrow-gauge track. If the narrow-gauge men anticipate success in the introduction of their system, from the fact that *their figures* show a result in their favor in regard to the proportions of dead weight to paying load, they will soon discover the truth of the old adage that "disappointment is the common lot of all men." Although it is said that figures won't lie, they frequently get the truth *awfully twisted*, and so far as relates to this matter of transportation, Blondin has beaten the most sanguine believer in the narrow gauge system, and yet, as before stated, his line has not become popular for the transportation of either freight or passengers. Blondin's best weight is reported at 140 lbs., while that of his passenger at Niagara was 180 lbs. Now, the best showings of the narrow-gauge men hardly come up to this, and yet Blondin has not undertaken to force his system into the notice of the public. This may be regarded as an extreme, and unworthy of mention in sustaining an argument against the narrow-

gauge system, but when we consider that certain laws of nature govern the transportation of goods and passengers by rail, to a certain extent, it seems impossible that the two or three feet gauge can be made to move the same amount of freight that is now moved with the ordinary gauge.

Without saying anything further in regard to carrying capacity of the narrow gauge, which will be admitted by all *practical men* to be worthless so far as carrying general freight is concerned, we may next consider the matter of speed. In descending mountain grades where there are no ascending grades to overcome, it is not a difficult matter to restrict the speed of trains to 12 or 15 miles an hour, or at such speed as may be necessary for safety; but it is well known by all practical railroad men that it is often necessary to run a freight train at a speed of 30, 40, or 45 miles an hour in order to overcome ascending grades, and what would be the result of such velocities with blocks of 15 tons or more of marble on a 2-ft. gauge on some of our sharp curves? The narrow-gauge men undertake to say that with their system goods may be transported on curves of very short radius. Now it is not desirable to run cars or locomotives on curves of any shorter radius than we now have. It is not necessary that a car or locomotive should be so constructed as to travel any sharper curves than those they now traverse with perfect ease and safety.

All things considered—carrying capacity, stability (which means safety), speed (which is essential to the satisfaction of the shipping public so far as regards freight, and comfort in passenger traffic)—all these things must be sacrificed in the adoption of the narrow-gauge roads. For stock manipulators the narrow-gauge will answer well enough, or for those who have accumulated wealth and are seeking some outlet for their latent energies and a means of getting rid of their surplus cash, the narrow-gauge railroad may serve as a substitute for the purchase and management of a farm, which now seems to be a favorite with men of more money than brains. At all events, I should not advise capitalists who are seeking for profitable investments to enter largely into the building of narrow-gauge railroads.

W. H. H.

THE PATENT OFFICE.

S. S. Fisher, a Cincinnati patent lawyer appointed Commissioner of Patents by General Grant when he assumed the presidency in 1869, resigned several months ago, having, it is presumed, obtained all the knowledge he wished, in that time, of the inside workings of cases in which he was personally interested, and left the office to run itself.

Gen. M. D. Leggett, of Ohio, as the newspapers inform us, has been appointed to the office, and has declined it, which was probably both honest and sensible on his part. Can any one inform us why a patent lawyer or some other lawyer is always given this place, and never an inventor? Thomas Ewbank, recently deceased, was appointed by General Taylor in 1849. It is almost the only instance when a Patent Office Commissioner has ever had any knowledge or pretention whatever to any mechanical genius or turn of mind. The United States can furnish some of the most eminent illustrious names known to the world, eminently fitted for successful inventions and achievements, for this place—men who know the dark places and vain tricks where poor inventors are taken in and both plucked and sheared by that worthy fraternity, the patent solicitors. Any of them would probably feel proud at being given an opportunity to reform and cleanse that Augean stable, and make it what it ought to be, a benefit both to inventors and the public, instead of a mere feeding place for the hungry pack of rapacious lawyers.

I have a theory of my own, that this office, instead of being an incumbrance in the path of the inventor, ought to be his aid and generous assistant. The money he now has to pay it ought to be sufficient to assure him a kind and respectful hearing from the officials there instead of, as now, paying not only office fees, but from two to a hundred times as much more to lawyers. Why should any man be compelled to *solicit* government to give him value received for his money? Why are all possible obstructions thrown in the way of inventors? Why is the procurement of a patent made a matter of so much red-tape ceremony, anxiety, expense and delay? The whole thing needs reforming from bottom to top. It is useless to point to the expense and trouble which other countries give inventors and contrast this with that. The whole tribe of patent lawyers and the like blood-sucking leeches ought to be kicked out, instead of being always given the best places, with opportunity still further to fleece their victims.

I present these facts to the powers that be, and call

urgently for a reform in this office. Of course this would be fought, tooth and toe-nail, by those who are getting their bread and butter out of poor inventors and giving nothing in return but what the government ought to give them now; but that only makes the case so much the more urgent. Let us for once, have an American inventor in the Patent Office at Washington! Let us for once have the Jeffersonian requisites—is he honest, is he capable, is he faithful to the Constitution!

"PROTECTION FOR CIVIL ENGINEERS."

TO THE EDITOR OF THE RAILROAD GAZETTE:

I see in your issue of the 14th ult. a very sensible article headed "Protection for Civil Engineers." As an engineer of thirty-three years practical experience, I have had occasion frequently to lament the humiliation of being compelled to recognize as professional brethren the "would-be civil engineers" referred to, men uneducated, inexperienced, and positively ignorant, who have forced themselves through the natural concomitant, impudence, on the credulity of the public, because they work cheap; whereas it would have paid the employing parties immensely better had they given them large salaries to remain at home, and secured for the work the services of reputable men. The former class of men generally work for small salaries, for two reasons: first, because of their own knowledge of their inability; secondly, because from their associations with the contractors they can make them up in some other way: the employers thereby suffering either from the work being unnecessarily burdened with material and consequently costing too much, or else too fragile and so endangering the lives of the public and necessitating early reconstruction, to say nothing of the costliness of keeping up the works from undue wear and tear, occasioned from the want of knowledge and experience in the correct principles of construction.

This subject I strongly urge as worthy of the special attention of the public, as well as of civil engineers themselves, and would recommend that it be brought before the Legislature early, in order that a law suitable for the case may be passed. And for the better facilitating of the movement, I would respectfully advise all interested to place themselves in communication with the writer of the article above referred to—addressed to your care—requesting him, as soon as he may find it advisable, to convene a meeting in some suitable central locality, at which meeting he should invite the co-operation of other well known brother professionals, when the subject could be fully discussed and material for a bill prepared.

PRACTICAL.

General Law for the Incorporation of Railroad Companies.

As the Illinois Legislature is required to make a general law for the incorporation of companies, all special laws being forbidden by the new constitution, the following form of a law proposed by the Massachusetts Railroad Commissioners may be suggestive:

SEC. 1. Any number of persons, not less than ten, may form a company for the purpose of constructing, maintaining and operating a railroad for public use in the conveyance of persons and property within this Commonwealth; and for that purpose may make and sign articles of association, in which shall be stated the name of the company, the places from and to which the road is to be constructed, maintained and operated; the length of such road, as near as may be, and the name of each town and county in this State through or into which it is intended to be made; the amount of the capital stock of the company, which shall not be less than twenty thousand dollars for every mile of road proposed to be constructed, and the number of shares of which said capital stock shall consist; and the names and places of residence of at least five persons who shall act as directors of the proposed company and shall manage its affairs until others are chosen in their places. Each subscriber to such articles of association shall subscribe thereto his name, place of residence, and the number of shares of stock he agrees to take in said company.

[Laws of New York, Acts 1850, ch. 140, § 1; 3 Statutes at Large, 617; Laws of Ohio, Act of May 1st, 1832; 1 Revised Statutes, p. 271; Statutes of Indiana, Gavin & Hord, Vol. 1, p. 594; Statutes of Illinois, Gross, Ed. 1869, p. 54, § 39; Compiled Laws of Michigan, Cooley's Ed., 1857, p. 631, § 1; General Statutes of Kansas, 1868, ch. 23, art. 3, § 5.]

SEC. 2. Said articles of association shall not be filed and recorded in the manner provided in section three of this act, until at least twenty thousand dollars of stock for every mile of railroad proposed to be constructed is subscribed thereto, and ten per cent. paid thereon in good faith, and in cash, to the directors named in said articles of association; nor until there is indorsement thereon, or annexed thereto, an affidavit made by at least five of the directors named in said articles, that the amount of stock required by this section has been in good faith subscribed, and ten per cent. paid thereon in cash as aforesaid, and that it is intended in good faith to construct, maintain and operate the road mentioned in such articles of association, which affidavit shall be recorded with the articles of association, as aforesaid. The provisions of section seven of chapter sixty-three of the General Statutes shall not apply to corporations organized under this act.

[Laws of New York, Acts 1850, ch. 140, § 2; Statutes of Illinois, Gross, Ed. 1869, p. 549 [40]; Statutes of Michigan, Cooley's Ed. 1857, Vol. 1, pp. 631-2.]

SEC. 3. Whenever it shall be shown to the satisfaction of the Board of Railroad Commissioners that all the provisions of sections one and two of this act have been complied with, the clerk of said board shall indorse upon the articles of as-

sociation a certificate of such fact and the approval of the Board in writing. The Secretary of the Commonwealth shall, upon the same being deposited in his office, and upon the payment of the sum of fifty dollars (\$50), cause the same, with the indorsement thereon, to be recorded, and shall issue a certificate in the following form:

COMMONWEALTH OF MASSACHUSETTS.

Be it known that whereas [here the names of the subscribers to the articles of association to be inserted] have associated themselves with the intention of forming a corporation under the name of [here the name of the corporation shall be inserted] for the purpose of building and operating a railroad between [here insert the description of the road contained in the articles of association] and have complied with the statutes of this Commonwealth in such cases made and provided. Now, therefore, I, [here the name of the Secretary to be inserted] Secretary of the Commonwealth of Massachusetts, do hereby certify that said [names of subscribers] their associates and successors, are legally organized and established as an existing corporation, under the name of [name of corporation] with the powers, rights and privileges, and subject to the limitations, duties and restrictions which by law appertain thereto. Witness my official signature hereunto subscribed, and the seal of the Commonwealth of Massachusetts hereunto affixed this day of _____ in the year of our Lord _____ [Day, month and year inserted.]

The Secretary of the Commonwealth shall sign the same and cause the seal of the Commonwealth to be thereto affixed, and such certificate shall be conclusive evidence of the organization and establishment of such corporation at the date of such certificate. The Secretary shall also cause a record of such certificate to be made, and a copy of such record duly certified may with like effect as the original certificate be given in evidence to prove the existence of such corporation.

[Acts 1870, (Mass.) ch. 224, § 11; Laws of New York, Acts 1870, ch. 140, § 3; Statutes of Illinois, Gross, Ed. 1869, p. 541, [41]; Statutes of Indiana, Gavin & Hord, Vol. 1, p. 504; Statutes of Michigan, Cooley's Ed., 1867, Vol. 1, p. 682, § 2.]

SEC. 4. The first meeting for the purpose of organizing such corporation shall be called by a notice signed by five or more of the subscribers to such articles of association, stating the time, place and purpose of such meeting, a copy of which notice shall, seven days at least before the day appointed for the meeting, be given to each subscriber, or left at his usual place of business or place of residence, or deposited in the post-office, post-paid, and addressed to him at his usual place of business or place of residence. And whoever gives such notices shall make affidavit of his doings, which shall be recorded in the records of the company.

[Acts 1870, (Mass.) ch. 224, § 9.]

SEC. 5. In case the capital stock of any company formed under this act is found to be insufficient for constructing and operating its road, such company may increase its capital stock from time to time to any amount required for the purposes aforesaid, not to exceed in all forty thousand dollars for each mile of road actually constructed. Such increase must be sanctioned by a vote in person or by proxy of two-thirds in amount of all the stockholders of the company, at a meeting of said stockholders called by the directors of the company for that purpose.

[Laws of New York, Acts 1860, ch. 120, § 9; Statutes of Indiana, p. 530, ch. 181.]

SEC. 6. Every corporation organized under this act, before commencing the construction of its road, shall present to the Board of Railroad Commissioners a petition for approval of location, accompanied with a map of the proposed route on an appropriate scale, and with a profile of the line on a vertical scale of ten to one compared with the horizontal scale, and with a report and estimate prepared by a skillful engineer from actual survey. The Board of Railroad Commissioners shall, on presentation of such petition, appoint a day for a hearing thereon, and the petitioners shall give such notice thereof as said Board shall deem reasonable and proper, in order that all persons interested may have an opportunity to appear and object thereto. If the Board of Railroad Commissioners, after hearing the petition, shall approve the proposed location, the corporation may proceed with the construction of their road; provided, that they shall first file with the County Commissioners of each county through which the road passes a plan of the location of road, defining its courses, distances and boundaries, and another copy of the same with the Board of Railroad Commissioners; but the location so filed shall not vary from the route first presented to said Board of Commissioners, unless said variation shall be approved by them. And said location shall be filed within two years from the time when the articles of association are filed in the office of the Secretary of State. The provisions of sections thirteen, fourteen, fifteen, sixteen and eighteen of chapter sixty three of the General Statutes shall not apply to corporation organized under this act.

[Laws of New York, Acts 1860, ch. 140, § 23-3; General Statutes of Connecticut, 1866, p. 187, § 474; p. 191, § 504.]

SEC. 7. If any corporation formed under this act shall not, within three years after its articles of association are filed and recorded in the office of the Secretary of State, begin the construction of its road, and expend thereon ten per cent. of the amount of its capital, or shall not finish the road and put it in operation in five years from the time of filing its articles of association as aforesaid, its corporate existence and power shall cease.

[Laws of New York, Acts 1860, ch. 140, § 47; Statutes of Indiana, Gavin & Hord, p. 517, § 34; Purden's Digest, (Penn.) 841, § 21.]

SEC. 8. Every corporation organized under this act shall, within one year after any part of their road has been constructed and opened for operation, cause to be made a map and profile thereof, and of the land taken or obtained for the use thereof, and file the same in the office of the Secretary of the Commonwealth; and also like maps of the parts thereof located in different counties, and file the same in the office for recording deeds in the county in which such parts of roads shall be. Every such map shall be drawn on a scale and on paper to be designated by the Board of Railroad Commissioners, and certified by the President and Engineer of such corporation.

[Law of New York, Acts 1860, ch. 140, § 45; Statutes of Indiana, Gavin & Hord, p. 517, § 33.]

SEC. 9. No railroad constructed under the provisions of this act shall be opened for use until it has been inspected and approved as in suitable condition for operation by the Board of Railroad Commissioners.

[General Statutes of Connecticut, 1866, p. 194, § 505.]

SEC. 10. Any corporation having actually constructed and put in operation a railroad under the provisions of this act may be consolidated with any existing railroad corporation of this Commonwealth or any adjoining State, with whose railroad such new railroad connects or intersects; and that such consolidation shall be ratified by a majority of two-thirds of the stock of each of said corporations at meetings duly called for the purpose, after one year's notice of such meetings duly given through the public prints, in such manner as the Board of Railroad Commissioners shall direct, and that such consolidation is not disapproved by the Legislature before

such meetings are held; and provided, also, that the entire stock and indebtedness of such consolidated company shall not exceed the united stock and indebtedness of the companies prior to such consolidation.

[Laws of New York, Acts of 1869, ch. 917; Statutes of Illinois, Gross, Ed. 1869, p. 537, III.; Statutes of Indiana, Gavin & Hord, p. 536, ch. 137; Statutes of Michigan, Cooley's Ed., 1867, Vol. 1, p. 683, ch. 67; Revised Statutes of Wisconsin, 1858, ch. 79, §§ 1-2; Purden's Digest (Penn.), p. 841, §§ 24-5.]

SEC. 11. Two corporations created by this State, or by the acts of this and an adjoining State, whose roads enter upon or connect with each other, may contract that either corporation shall perform all the transportation of persons and freight upon and over the road of the other: provided, that one year's notice of the intention to make such contract shall be given in writing by such corporation to the Board of Railroad Commissioners, and that such contract is not disapproved by the Legislature before the expiration of such year of notice; and provided, also, that the income arising from such contracts shall be subject to the provisions of law in regard to the right of the State to purchase the roads or reduce their tolls, in the same manner as that arising from the use of the roads. Section one hundred and fifteen of chapter sixty-three of the General Statutes, and chapter two hundred and ninety-eight of the acts of eighteen hundred and sixty-seven are hereby repealed.

[General Statutes (Mass.), chap. 63, § 115; Acts 1867, chap. 196.]

Railroad Earnings for the Month of December, and for the Year 1870.

For the month of December, the principal roads make returns which compare favorably with the same month in 1869. It is too well known that the business of the country was not particularly brisk in that month, to suppose that the railroads have been doing anything more than the regular transportation work demanded by the mercantile community, and we conclude that the earnings are but a fair average, uninfluenced by temporary causes. The Central Pacific shows an increase of \$145,146; Chicago & Alton, \$45,747; Cleveland, Columbus, Cincinnati & Indianapolis, \$27,884; Cleveland & Pittsburgh, \$30,233; Illinois Central, \$58,555; Milwaukee & St. Paul, \$33,208; North Missouri, \$52,131. Ohio & Mississippi shows a slight decrease of \$4,425.

EARNINGS IN DECEMBER, 1870.

	1870.	1869.	Inc.	Dec.
Central Pacific.....	\$612,805	\$467,659	\$145,146	.....
Chicago & Alton.....	380,568	334,821	45,747	.....
Cleveland, Col., Cin. & Ind.	284,150	256,272	27,884	.....
Cleveland & Pittsburgh.....	318,979	288,746	30,233	.....
Illinois Central.....	755,228	696,673	58,555	.....
Marietta & Cincinnati.....	141,376	111,337	30,039	.....
Michigan Central.....	423,755	371,542	52,213	.....
Milwaukee & St. Paul.....	529,758	496,550	33,208	.....
North Missouri.....	255,736	203,595	52,131	.....
Ohio & Mississippi.....	250,471	254,896	4,425	.....
Pacific of Missouri.....	271,307	236,108	35,099	.....
St. Louis, Alton & T. H.....	187,794	168,559	19,235	.....
Toledo, Wabash & West'n	\$385,254	434,283	48,929	.....
Union Pacific.....	\$429,538	716,828	287,290	.....

*Approximate statements.

For the whole year 1870 the earnings are now complete (except in those few instances where the last month has been reported only approximately), and the result of the year's operations may, therefore, be compared with those of its predecessors. Such a comparison shows that, so far as the gross earnings are concerned, the business of the year has been larger than in 1869, and very considerably larger than in 1868. It must be remembered, however, that the mileage of a number of the prominent lines has been increased during the year, and that the amount of earnings per mile, which is the better standard by which to estimate railroad earnings, may have been less, while the gross receipts were larger.

The increased number of miles operated by several prominent lines at the close of the year 1870 may be seen in the following table:

	December, 1870.	December, 1869.
Central Pacific.....	890 miles.	742 miles.
Chicago & Alton.....	465 "	431 "
Illinois Central.....	1,107 "	974 "
Milwaukee & St. Paul.....	1,018 "	726 "
Ohio & Mississippi.....	353 "	340 "
St. Louis, Alton & Terre Haute.....	221 "	210 "

If the expenses of operating newly opened lines, or branches, were always equal to those of the older portion of a road, then the gross earnings should show an increase proportionate to the increased mileage, to place the company in an equally good condition; but as the operating expenses on branches just opened, with few trains running, are frequently small, a proportionate increase in earnings is not to be expected. The actual results of the year's work on the roads named may be seen in the table following:

EARNINGS FOR THE WHOLE YEAR 1870.

	1870.	1869.	Inc.	Dec.
Central Pacific.....	\$7,983,513	\$6,746,595	\$1,236,918	.....
Chicago & Alton.....	4,831,739	4,681,562	150,177	.....
Cleveland, Col., Cin. & Ind.	3,280,430	3,128,776	151,654	.....
Illinois Central.....	8,551,492	8,321,749	229,743	.....
Marietta & Cincinnati.....	1,418,505	1,292,490	126,015	.....
Michigan Central.....	4,791,695	4,749,163	42,532	.....
Milwaukee & St. Paul.....	8,130,437	7,148,496	981,941	.....
North Missouri.....	2,833,489	2,024,352	809,137	.....
Ohio & Mississippi.....	3,188,137	2,915,548	272,589	.....
Pacific of Missouri.....	3,479,776	3,149,129	330,647	.....
Toledo, Wabash & W'n	4,426,429	4,252,336	174,093	.....
Union Pacific.....	7,522,112	.....	.....	.....
Total (not including Union Pacific).....	\$53,306,182	\$48,013,136	\$5,293,046	.....

The prospect for the future would seem to be in favor of a steady increase in earnings upon all well located routes. The business of the country is increasing rapidly, particularly that trade between the interior and the seaboard, which necessitates a large increase in the demand for transportation. Should the growth of railroad traffic in the next ten years equal that of the past decade, the most sanguine expectations may be entertained in regard to the prosperity of well-managed lines.—Commercial and Financial Chronicle.

The Vermont Consolidation.

A correspondent of the Boston Advertiser, writing from Rutland, Vt., under date of the 27th ult., gives the following account of the contest between the two great railroad corporations of Vermont, the Vermont Central and the Rutland, which has ended in the lease of the latter by the former, which now controls all but about 100 miles of the railroads of Vermont, besides others in New York and Canada, including the connections of New York with Montreal:

In order to appreciate fully the nature and magnitude of the transaction just completed, one must take a comprehensive view of the field. Speaking in a general way of the situation about the middle of the last decade, the Rutland and the Central may be described as parallel lines, but with two points of convergence, one north and one south. The northern focus was Burlington, the southern Bellows Falls. North of Burlington the Central was supreme, while the southern outlet was controlled by neutrals. This inequality was partially redressed about six years ago, when the Rutland people obtained control of the Vermont Valley road, between Bellows Falls and Brattleborough, and thereby to a great extent of the business passing from the Central down the Connecticut valley. Three years later the Rutland Company, chafing under their restraints at Burlington, boldly crossed Lake Champlain and seized the Montreal & Plattsburgh Railroad, welding together the detached ends of their line by the swift and stanch steamer Oakes Ames. This maneuver gave them control of an independent outlet both to the West and to Canada, and they maintained, under some disadvantages, a respectable struggle for the business of both those sections. The Ogdensburg & Lake Champlain Railroad met both rivals, the Rutland at Moores Junction, the Central at Rouse's Point, and the possession of this line, therefore, became a problem to be solved. Without much apparent opposition from the enemy the Central succeeded in leasing it last fall, the Rutland maintaining its Montreal line intact. Meantime the latter was sending out skirmishers in all directions, picking up sections of the Whitehall & Plattsburgh Railroad as fast as they were completed, and the Addison Railroad almost as soon as it was chartered. These events bear but slightly on the struggle with the Central, and may be passed over without comment.

This sketch brings matters down to November, 1870, and shows the situation and the attitude of contending parties at the close of that month. On the first of December the Rutland corporation stretched its powerful arm down into Massachusetts and grasped a section of the Vermont & Massachusetts Railroad. The effect of this was to make the Rutland independent of the Connecticut River road, and to frustrate any possible alliance between the latter and the Vermont Central. It was clear that Rutland if it had not outgeneraled its adversary, had at least brought the contest to a point after which it could be maintained no longer without serious injury to the interests of both parties. From sheer exhaustion, apparently, and as a measure of peace, came the proposition for the lease of the vast property owned or controlled by the Rutland Company to its sturdy and powerful rival. The two ex-governors, Smith, of the Vermont Central, and Page, of the Rutland, each aided by capable lieutenants, sat down to adjust the compromise. The negotiations were speedily concluded, the proper ratifications on the part of the former were at once obtained, and on Thursday the stockholders of the Rutland lent their sanction to the proceedings.

Thus ends the long strife. On both sides it has been carried on with a vigor, an audacity, a comprehensiveness of scope and of means which hardly have a parallel in the railroad annals of New England. After the appearance of the two governors on the field, at the head of the rival forces, the contest assumed a new magnitude, and was prosecuted with desperate energy. They wielded the vast interests at their command with marvelous skill. St. Albans and Rutland were the centers of two camps, arrayed against each other by a hostility as real as that which divides the contending armies in France. From these points the commanders issued their directions, and in the violence of the struggle the whole State was rocked.

The news of the armistice must be welcome to a people tired of the exhausting strife. The advantages of competition are slight when purchased at such a cost—the peace of the State and the best energies of both factions. To the latter the lease secures obvious and great benefits. The Rutland Railroad is released from all the cares and duties of active management, and is assured ample rental for its property so long as the lessees fulfil the terms of the contract. The Vermont Central managers obtain absolute control of the railway interests of the State, and liberty to prosecute their grand schemes in the Northwest. While Governor Page, as President of the Rutland Company, is congratulated on his success in the disposition made of its property, Governor Smith is no less warmly complimented on his last bold and masterly maneuver. He seems to be in a bet or position than ever to realize the dream of his admirers. He has ambition, courage, perseverance, sagacity—all the elements of executive ability. His friends predict that he will stretch the sway of the Vermont Central from the Atlantic to the Pacific, and be able some day to ride in his own car over his own line, from Boston to Puget Sound.

But this is a dream, and only a dream. Let me, therefore, descend from the realm of imagination to that of fact, and, before closing, give your readers a notion of the interests now united under the Vermont Central. I have said that the lessees become absolute masters of the railroads of the State. The statement needs a slight, and only a slight, modification. The Passumpsic River Railroad is an independent Vermont corporation, and in a thriving condition. It is a short line, extending only from White River Junction to

Newport. The Harlem extension can hardly be regarded as a Vermont concern. The total number of miles now controlled by the lessees is 645. Of this number, 247 belonged to the Rutland, and 398 to the Central, and of these numbers again, 120 miles constituted the original line of the Rutland, and 183 the original line of the Vermont Central, respectively. The remaining figures in each case represent the various roads which have been absorbed by each from time to time. This calculation omits the Addison Railroad, which is not yet built, but was leased prospectively. The gross earnings of the Rutland last year were about one and one-half millions; of the Central two and one-half millions. The gross earnings of the consolidated roads ought to be not less than four millions of dollars per annum on last year's figures. But if the past rate of increase be maintained in the future, the receipts by the time the lease expires will be something marvelous. The immediate connections of this network of roads embrace the following lines: Rome, Watertown & Ogdensburg; Grand Trunk, at several points; Rensselaer & Saratoga; Harlem Extension; Connecticut River; Vermont & Massachusetts; Cheshire; Northern New Hampshire; Passumpsic River; besides steamboat lines on Lake Champlain and the St. Lawrence and various roads projected but not built. It only remains to be added, that all interested parties appear to be equally well satisfied with the arrangement, and both lessors and lessees predict that under it railroad growth and development in the Green Mountain State will be at a rate never before realized.

Eminent Domain as Applicable to Railroads and Their Franchises.

BY ELLIOTT ANTHONY.

1. What is eminent domain?

The term *dominium*, as used by civilians when applied to property, has several significations. Erskine says: "The interest which the superior retains to himself in all feudal grants is called *dominium directum*, because it is the highest and most eminent right; and that which the vassal acquires goes under the name of *dominium utile*, as being subordinate to the other." The full and absolute ownership, *dominium plenum*, indicates both the *directum* and the *utile*. The term *dominium eminens* is not, properly speaking, property; but the right of the State over the property of individuals. It is defined in Cooper's Justinian, "the right of the public, in cases of emergency, to seize the property of individuals and convert it to public use." Bowyer says: "The *jus eminens* is that right which the entire body has over the members and whatever belongs to them, and which being for the common good is superior to the private rights of individuals belonging to their private interests. This *jus eminens* is called by writers on public law, *dominium eminens*, when it regards property. It is the right of the State, or the sovereign power, over property within it, when necessity or the public good requires. This is the true foundation of the right of taxation." Again, he says, "the right called *dominium eminens* is a part of the sovereign authority, and one of the *jura majestatis*." Vattel defines *dominium eminens*, or *eminent domain*, to be the "right which belongs to the society or the sovereign, of disposing, in case of necessity and for the public safety, of all the wealth contained in the State." But this definition is obviously defective and incorrect. Chancellor Wilworth says: "All separate interests of individuals in property are held of the government, and, notwithstanding the grant to individuals, the eminent domain, the highest and most exact idea of property, remains in the government, or in the aggregate body of the people in their sovereign capacity, and they have a right to resume possession of the property in the manner directed by the constitution and laws of the State whenever the public interest requires it. This right of resumption may be exercised, not only where the safety, but, also, where the interest, or even the expediency of the State is concerned; as where the land of the individual is wanted for a road, canal, or other public improvement."

It is seen from these definitions that the term *eminent domain* is applied to one of the *jura majestatis*, it is that highest right over property which is in the government, and is never granted to the individual, and, therefore, is essentially different from what is ordinarily understood by the word property. The term *eminent domain*, properly speaking, is not applicable to the property of individuals, for the right of the State to dispose of its property results from its ownership, and not from the right of eminent domain, which latter right remains in the State after it has transferred the ownership of its property. It is a right which is from its very nature inseparable from the sovereignty, and is necessarily transferred with the sovereignty. Gardner's Institute, Kent, etc.

2. Eminent domain is, then, an attribute of sovereignty and belongs to every nation and state.

It is the right of taking private property for public use in the mode prescribed by the constitution and laws and for the objects adjudged by their respective legislatures to be of public utility. 10 Pet., 723-3; 3 How., 223; 6 How., 531; 25 Wend., 173; 2 Kent's Commentaries, 333; Ill. 19 Barb., 166-168; 3 Selden, 314; 1 Kernan, 314.

It may be exerted by a state or nation, by the intervention of agents, corporate bodies, municipal corporations, or any tribunal authorized by law to employ it.

This right of eminent domain proceeds on the principle that the ultimate property in every community, both as to reality and personality, belonging to citizens and resident foreigners domiciled there, resides in the state or nation, and that it may properly take private property for public use when the public good shall be adjudged by the Legislature to acquire it. 6 How., 531; 4 Wheat., 429; 16 Pet., 447.

Or it may be thus stated:

Eminent domain is the right of society or of the sov-

ern power, or the political body, organized in such mode, or exerted in such way, as the community or State may have thought proper to ordain.

"It is undeniable that the investment of property in the citizen by the government, whether made for a pecuniary consideration or founded on conditions of civil and political duty, is a contract between the State or the government, acting as its agent, and the grantee, and both parties thereto are bound, in good faith, to fulfill."

"But into all contracts, whether made between states and individuals, or between individuals only, there enter conditions which arise not out of the liberal terms of the contract itself—they are superinduced by the pre-existing and higher authorities of the laws of nature, of nations, or of the community to which the parties belong; they are always presumed, and must be presumed, to be known and recognized by all, are binding upon all, and need never, therefore, be carried into express stipulation, for this could add nothing to their force. Every contract is made in subordination to them, and must yield to their control as conditions inherent and paramount, wherever a necessity for their execution shall occur. Such a condition is the right of eminent domain. This right does not operate to impair the contract affected by it, but recognizes its obligation in the fullest extent, claiming the fulfillment of an essential and inseparable condition. Thus, in claiming the resumption or qualification of an investiture, it insists merely on the true nature and character of the right invested. The impairing of contracts inhibited by the constitution can scarcely, by the greatest violence of construction, be made applicable to the enforcing of the terms or necessary import of a contract—the language and meaning of the inhibition were designed to embrace proceedings attempting the interpolation of some new term of condition foreign to the original agreement, and, therefore, inconsistent with and violative thereof. It, then, being clear that the power in question not being within purview of the restriction imposed by the tenth section of the first article of the Constitution, it remains with the states to the full extent in which it inheres in every sovereign government, to be exercised by them in that degree that shall by them be deemed commensurate with public necessity."

3. The right of eminent domain authorizes the legislative powers to devote private property to public use. It must be a public use. But, in the exercise of this power the legislative are the exclusive judges of the degree and quality of interest which are proper to be taken, as well as the necessity for taking it. De Vaux v. Fox; 2 Blatchford, 95.

4. The sovereignty of a state is the collection of the wills and powers of all the individual members of which the state is composed.

According to Grotius it has two subjects—common and proper—the former being the state itself, or the community which constitutes the state, and the latter the person or persons in whom, by the organic laws, the power is vested; the former being the source, is one and indivisible, while the latter may be one or many, and is frequently divided—legislative, executive, and judicial.

The sovereignty of a state is therefore its public power or authority, and the sovereign is the person or body of the persons who are invested with that power or authority. If that power or authority remains in the community, the common and proper subjects are one and the same; if vested in a number of individuals, it is an aristocracy—if in a single person, it is a monarchy.

5. Private property can only be taken pursuant to law; but a legislative act declaring the necessity is for this purpose "the law of the land," and no further adjudication or finding is essential. 5 Ohio, N. S. 146. In this case the court says: "Whatever may be the theoretical foundation for the right of eminent domain, it is certain that it attaches as an incident to every sovereignty, and constitutes a condition upon which all property is holden. When the public necessity requires it, private rights to property must yield to the paramount right of the sovereign power. We have repeatedly held that the character of the work for which the property is taken, and not the means or agencies employed for its construction, determines the question of power in the exercise of this right."

It requires no judicial condemnation to subject private property to public uses. Like the power to tax, it resides in the legislative department to whom the delegation is made.

It may be exercised directly or indirectly by that body, and it can only be restrained by the judiciary when its limits have been exceeded or its authority has been abused or perverted. 5 Ohio, 146.

6. Franchises. The grant of a franchise is of no higher order, and confers no more sacred title than a grant of land to an individual; and where the public necessities require it, the one as well as the other may be taken for public purposes, on making suitable compensation; nor does such an exercise of the right of eminent authority interfere with the inviolability of contracts. 6 Howard, 507; Richmond & C. R. R. Co. vs. Louisa R. R. Co., 13 How., 71.

Milnor v. R. R. Co., 6 Am. Law Reg. 6.

In other words, the franchises of corporations are subject to the same sovereign right of eminent domain by which the property and rights of all individuals are liable to be taken and appropriated to a public use, whenever the Legislature shall deem that the public exigencies require it.

West River Bridge Co. vs. Dix, 6 How., 507.

Richmond R. R. Co. vs. Louisa R. R. Co., 13 How., 71.

Boston & Lowell R. R. Co. vs. Salem R. R. Co., 2 Gray, 1-35.

Springfield vs. Conn. R. R. Co., 4 Cush., 63.

Cent. Bridge Co. vs. City of Lowell, 4 Gray, 474.

Enfield Toll Bridge Co. vs. Hartford & New Haven R. R. Co., 17 Conn., 40-454.

White River Turnpike Co. vs. Vermont Cent. R. R. Co., 21 Vt., 590.

Red River Bridge Co. vs. Mayor, &c., 1 Sneed, 176.

Nota Bene Northern R. R. Co. vs. Concord & Claremont R. R. Co., 7 Foster, 183.

Pierce vs. Somersworth, 10 N. H., 370.

Crosby vs. Hanover, 38 N. H., 406.

James River R. R. Co. vs. Thompson, 3 Gratt., 270.

Newcastle Railway Co. vs. P. & J. Railway, 3 Ired., 461.

Tuckahoe Canal Co. vs. T. & James River Railway, 11 Leigh, 42.

Bonaparte vs. Camden & Amboy R. R. Co., 1 Baldwin, 205.

7. Eminent domain does not impair the obligation of contracts, for every contract is made in subordination to it.

The old Dartmouth College case seems to overshadow everything, and we are too apt to think that it covers every case which can be mentioned, whether relating to public or private rights, but I respectfully submit that the principles of that case are subject to some limitations.

In the case of the West River Bridge Company vs. Dix, reported in 6 Howard, page 332, it is declared that—

"No State shall pass a law impairing the obligation of contracts; yet, with this concession constantly yielded, it cannot be justly disputed that in every political sovereign community there inheres, necessarily, the right and the duty of guarding its own existence, and of protecting and promoting the interests and welfare of the community at large."

"This power and this duty are to be exerted, not only in the highest acts of sovereignty, and in the external relations of governments; they reach and comprehend, likewise, the interior polity and relations of social life, which should be regulated with reference to the advantage of the whole society. Under every established government the tenure of property is derived, mediately or immediately, from the sov-

ereign power, or the political body, organized in such mode, or exerted in such way, as the community or State may have thought proper to ordain.

"It is undeniable that the investment of property in the citizen by the government, whether made for a pecuniary consideration or founded on conditions of civil and political duty, is a contract between the State or the government, acting as its agent, and the grantee, and both parties thereto are bound, in good faith, to fulfill."

"But into all contracts, whether made between states and individuals, or between individuals only, there enter conditions which arise not out of the liberal terms of the contract itself—they are superinduced by the pre-existing and higher authorities of the laws of nature, of nations, or of the community to which the parties belong; they are always presumed, and must be presumed, to be known and recognized by all, are binding upon all, and need never, therefore, be carried into express stipulation, for this could add nothing to their force. Every contract is made in subordination to them, and must yield to their control as conditions inherent and paramount, wherever a necessity for their execution shall occur. Such a condition is the right of eminent domain. This right does not operate to impair the contract affected by it, but recognizes its obligation in the fullest extent, claiming the fulfillment of an essential and inseparable condition. Thus, in claiming the resumption or qualification of an investiture, it insists merely on the true nature and character of the right invested. The impairing of contracts inhibited by the constitution can scarcely, by the greatest violence of construction, be made applicable to the enforcing of the terms or necessary import of a contract—the language and meaning of the inhibition were designed to embrace proceedings attempting the interpolation of some new term of condition foreign to the original agreement, and, therefore, inconsistent with and violative thereof. It, then, being clear that the power in question not being within purview of the restriction imposed by the tenth section of the first article of the Constitution, it remains with the states to the full extent in which it inheres in every sovereign government, to be exercised by them in that degree that shall by them be deemed commensurate with public necessity."

The Court then determines that, under the sovereign power that they have, they could take and condemn any charter of a corporation, and say in express terms that the franchises granted to a corporation are, in fact, but an artificial species of property and subject to the sovereign power of the State.

8. Our Constitution is the first one in the history of this country which asserts the absolute sovereignty of the people over railroads. It declares them to be merely their "creatures," and ordains that a creature shall not be above its creator. Hereafter the members of the General Assembly cannot constantly cry out that they have no power to regulate railroads—that it is unconstitutional and impairs contracts, and destroys vested rights—for the people have decided that to regulate and control railroads is to be done by their collected and sovereign will, and is not unconstitutional. The power, therefore, conferred upon the General Assembly of this State is not to be frittered away. An organic law is not to be construed as an ordinary statute, but to be regarded as the collected will of the whole people. This view was very forcibly presented by Judge Denio, in the case of "The Matter of Oliver Lee & Co.'s Bank, 21 N. Y., p. 10," in which he says:

"The defendant's counsel insists that we should not construe the clause so as to disturb vested interests, unless compelled by language which would not admit of any other meaning. But we are not to interpret the Constitution precisely as we would an act of the Legislature. The convention was not obliged, like the legislative bodies, to look carefully to the preservation of vested rights. It was competent to deal, subject to ratification by the people and the Constitution of the Federal Government, with all the existing laws and institutions of the State. If the convention had so willed, and the people had concurred, all former charters and grants might have been annihilated."

"When, therefore, we are seeking for the true construction of a constitutional provision, we are constantly to bear in mind that its authors were not exercising a delegated authority, limited by other constitutional restraints, but are to look upon establishing such principles as seem best calculated to produce good government and promote the public happiness, at the expense of any and all existing institutions, which might stand in their way."

Apply, then, the principles here laid down, and every railroad corporation in the State of Illinois must become subordinate to the provisions of the new Constitution, under the pains and penalties of an absolute forfeiture of all of their rights, privileges and franchises if they refuse.

If the Republic could, in the time of its peril, command the lives of its citizens, and offer them as a holocaust on the altars of our country, we think that monopolies can be subjugated by the same strong hand when they threaten to control the destinies of the nation. The principles which we invoke involve merely the exercise of the same sovereign powers in the one case as in the other.—Chicago Tribune.

Boiler Explosions.

We copy from the *Engineering* a portion of the evidence given before a parliamentary committee appointed to inquire into "The Causes of Steam Boiler Explosions and the Best Means of Prevention":

The chairman prefaced the inquiry by handing in certain suggestions for the guidance of the committee. After drawing attention to the most serious of boiler explosions that had just before happened, particularizing that at the Kidsgrove Ironworks, Staffordshire, which, he said, occurred "immediately upon the heels" of the explosion in Dublin, and resulting in the death of thirteen workpeople, the chairman said: "It appears that, upon striking an average of several years, as many as fifty explosions occur every year, killing seventy-five persons and injuring at least as many others, if not more. On comparing this with the loss of life consequent on railway traveling, it seems that for every railway passenger killed from circumstances beyond his own control, three persons are killed by boiler explosions." They had, therefore, before them a year of national calamity which called for their most earnest consideration. He avowed that he entertained sanguine hope that the examination of competent witnesses would show that the constant recurrence of

these catastrophes was not unavoidable, but preventable—that explosions that were so disastrous in their results were by no means mysterious, but were due to the simplest causes; that they were governed by known laws, and could be grappled with and prevented by the exercise of common knowledge and common care. There had arisen in Manchester a system of periodical inspection, which had proved itself adequate to the prevention of explosions so far as it had been adopted; and he believed it could be shown to the satisfaction of the committee that if the system of periodical boiler inspection were adopted by every steam user in the country explosions would be brought to an end. In weighing the various plans that had been proposed for securing boiler inspection, three considerations had to be complied with: The first, that inspection should be rendered general; the second, that it be rendered efficient; and the third, that the steam user be protected from harassing interference. He believed that the labors of the committee would not only result in ridding the country of the present scourge of boiler explosions, but at the same time in aiding the progress of science and the use of steam. The committee then proceeded to take evidence, of which we give an abstract:

SIR WILLIAM FAIRBAIRN

had an experience of sixty years as mechanical and civil engineer. He was one of the first to investigate boiler explosions systematically, and was mainly instrumental in establishing the first boiler association. The society which he represented was first called "The Association for Preventing the Explosions of Steam Boilers, and effecting Economy in the Use of Steam." In 1865 the name was shortened to "The Steam Users' Association." Boiler explosions were almost unknown before 1835. When high-pressure steam was introduced disasters ensued, chiefly from ignorance of the properties of steam above 10 lb. pressure. Many boilers intended for 7 lb. were used for 30 lb. or 40 lb. Was frequently called in by coroners to report upon explosions, and for many years was occupied with these investigations. Experience thus gained suggested the society above named in the year 1833, which was formed at a public meeting at Manchester. The association was strictly voluntary, and all the benefits of inspection were secured for a small sum per annum per boiler. He so much approved of this association, that he would recommend it as a model; and he thought that during its fifteen years' working it has shown itself superior to any other association for the same purposes. No dividends were paid, any surplus being expended in useful scientific investigations. With a very careful periodical inspection of boilers, explosions would rarely be heard of. He had always contended against insurance, as most of the shareholders in insurance companies were steam users, and although they paid a higher rate than the association, they got most of it back in the shape of dividends. Insurance did little to prevent explosion, as most companies tried to make money at the least cost, and to the neglect of inspection. He was doubtful if even the largest insurance company, with 10,000, had more inspectors than his association with 2,000 boilers. Believed that about 1,000 persons have been killed, and 1,100 injured by boiler explosion during the past thirty-five years, or, on the average, about fifty explosions per annum, killing seventy-five persons. The causes of explosions he attributed (1) to undue pressure, which might be remedied by more perfect boilers of better materials, and better fitted, and worked at one-quarter the bursting pressure. (2) To collapse of flues, which might be prevented by hoops of T or angle iron placed 10 ft. apart. Experiments showed that even flues of a true circular shape followed a fixed law as to collapse, similar to that for girders, and that their strength was inversely as their length. (3) To corrosion, the danger of which had increased since high pressure steam was used; the cure for which was frequent inspection and sound workmanship to prevent leaking. The action of corrosion was both mechanical and chemical. A coating of oxide was formed, and when that fell off a fresh surface was exposed to chemical action. It took place out of sight, where brick-work was in contact with the plates, and they are wet and dry alternately. The rapid internal corrosion, which looked like grooving made with a tool, $\frac{3}{8}$ in. deep, was more difficult to explain. In locomotive boilers it was pretty clear that there was mechanical action from change of temperature and pressure. The solid plate was bent backwards and forwards very slightly, and the oxide was continually thrown off, exposing fresh surface. It could not be prevented by negative chemical agents, and no "nos-trums" put in the water were so good as inspection. Inspection was the secret of security, and, if properly performed, malconstruction and all other imperfections might be discovered and danger removed.

Sir William then directed attention to what he considered the unsatisfactory investigations of coroners' inquests on those killed by boiler explosions. He did not attribute it only to the want of intelligence in the jury, but to the ignorance of many of the witnesses. He thought that the Government, as conservators of human life, should compel the attendance of competent, independent, scientific persons conversant with the subject, to ascertain the cause of explosions, and fix the responsibility on the author of the catastrophe.

Inspection should be compulsory, and at the cost of the owner, who might employ such an association as the one of which he was president. Boiler explosions would not, perhaps, be entirely prevented by inspection, but so much lessened that instead of fifty per cent. there might only be five. The liability, in case life was lost by explosion, shall fall on the owner; but if his boiler had been properly inspected it should exonerate him. The inspecting company should be liable if they had neglected to do their duty, but not otherwise. If boiler minders were careless, and tied valves, or tampered with gauges, it showed that the owner was employing an improper person, and a jury would have to decide how far the owner was responsible for the lives

lost. Boilers should be tested to one-fourth the bursting pressure, or double their working pressure; inspection shall be added to testing certificates; should be given after inspection. If inspections were left to responsible associations there would be no need for Government to control them, as they would look after the inspectors and be responsible to the public. The Steam Users' Association advocated that Government should establish the principle that all boilers be inspected, but leave the details to private associations. In certain cases there might be Government interference, but no Government system of inspection should be established. Something should be done to induce owners to join the associations. There was no difficulty in obtaining good inspectors, but they should be well paid, as they must be intelligent mechanical engineers. Having once made sure that the boiler was good, the association should take care that it was kept so. A prosecution under Lord Campbell's Act is seldom heard of after a boiler explosion. Inspection under municipal authorities would not be better than Government inspection. Although the Steam Users' Association had reached only a small portion of the boilers, the voluntary system had not failed, as they had set an excellent example. Very few explosions or deaths had happened from their boilers. The boilers under that association belonged to some of the most carefully worked concerns. The rate charged was about £1 11s. 6d. per annum per boiler. The private inspection of a qualified engineer should also be sufficient, which could be judged of from actual experience by the party employing him. The associations helped owners to obtain competent inspection, but the owners must be left to choose the inspectors, and incompetence would be rare. The associations might be regulated by Government, and no other inspection should be deemed sufficient. The test need only be insisted on when there was a doubt as to the state of the boiler. When a boiler was condemned by an inspector it should cease to be used.

MR. LAVINGTON E. FLETCHER,

Chief Engineer to Steam Users' Association, said he had investigated the most important of the explosions since 1861. After speaking of six of the most fatal, involving the death of ninety-four people and the ascertained injury of eighty-four, witness stated that during the present year there had been twenty explosions, killing forty-four persons and injuring thirty-four. In 1869 there were fifty-eight explosions, killing eighty-six and injuring 126. From 1864 to 1869 there were 539 explosions, killing 909 and injuring 1061 persons. Including the year 1870 there had been 559 explosions, by which 953 persons were killed and 1,114 injured—altogether, 2,067. Many other explosions happened, of which no records have been obtained. Last year, 1869, eighty-six were killed. In less than half this year, 1870, forty-four have been killed. The persons killed every year by boiler explosions exceeded the number of passengers killed on all the railways of the United Kingdom. From 1865 to 1869, 112 passengers were killed by causes beyond their own control, and 336 were killed by boiler explosions, or three times as many. The causes of explosions had been involved in unnecessary mystery. They happened from known laws, and from the pressure of steam within the boilers. Boilers burst because they are bad, either from neglect of the boiler-maker in turning out a bad boiler, or the boiler-master in letting it get into bad condition, or the boiler-master in letting the water run short. Minders were often said to cause explosions, which proceeded from the want of science in the maker or the greed of the master. Where the boiler-master had to answer for one explosion the boiler-maker or the master had to answer for six. In the fifty-eight explosions last year twenty-six were from malconstruction; fifteen from bad condition; seven from shortness of water; one from use of composition; one from overheating; but doubtful; eight uncertain. From June, 1861, to June 17th, 1870, there were 441 explosions, killing 639 and injuring 793 persons. No details were obtained of many, but out of 297 cases 120 were from malconstruction of shells or fittings; eighty-eight from bad condition; forty-four seams bad over external fire; thirty short of water; six from incrustation; one from use of composition; one doubtful; five from excessive pressure and valves tampered with; one economizer, from either gas in the flues or over pressure; one independent of boiler and accidental. The most frequent source of malconstruction is the omission of hoops on furnace tubes in Cornish and Lancashire boilers. The Steam Users' Association had taken great pains to explain the use of these hoops, and to circulate the information broadcast. It was found in 1866 that out of 227 explosions forty-nine were of the Cornish class, or one in every four or five; yet when well made and carefully used it was the safest boiler, and never burst until it was abused. Another form of malconstruction is the weak manhole, or merely a hole in the plate, without strengthening rings. This was often found in very small boilers, yet their explosion had caused many deaths. Another form of malconstruction is want of stays. The unwise practice of taking out tubes from Cornish or Lancashire boilers without inserting suitable stays was a frequent source of explosion. Malconstruction was sometimes due to bad material and workmanship; and again to the defective equipment of the boilers. A spring safety valve was shown from an exploded boiler in which a turn of a nut added 80 lb. A similar valve had caused another explosion. With regard to defective condition, boilers were worked on until corroded to the thickness of paper; sometimes externally from damp flues, or internally from bad water. An example was described of a boiler twenty years old, and worked at 50 lbs., corroded along the bottom as thin as paper where it rested on the brick-work. It had never been inspected, as the flues were too narrow. Specimens of internal corrosion were shown from Aberaman, where two boilers exploded in 1864. The feed water was from coal workings, and very corrosive. Another specimen was shown from Bury, reduced from

7-16 to 1-16 in two years. A very roughly-made patch from an exploded boiler was shown, with thirty-seven bolts and a plate on inside and out, filled in with hemp. This was to cover corrosion, and itself led to further corrosion from leaking. At the inquest the cause was attributed to the unskillfulness of the engineer in making the patch, but no blame was attached to him. A model and photographs were shown of a boiler which exploded at Chatham in 1866 from external corrosion; much damage was done. The best means of grappling with explosion was by competent inspection. Boilers should be inspected and tested before leaving the makers' yard, and also periodically, while they were both under steam and at rest. Every boiler should have an "entire" examination once a year, when it should be entered and the flues passed through. Mr. Fletcher stated that during the nine and a half years he had been Chief Engineer to the Steam Users' Association, only one boiler approved by them had exploded, and that from the injudicious use of boiler composition, which was supposed to prevent incrustation. This was at the rate of one approved boiler in 10,000. Proper blowing-out had been neglected. The Steam Users' Association had always discountenanced "dosing boilers with patent medicines." The Steam Users' Association had five other explosions of boilers not approved by them, but under their inspection. One of these had an oval flue of very weak form, which it was ordered should be strengthened; but it burst while this was delayed. During the last five and a half years the Steam Users' Association has indorsed its approval of boilers by guaranteeing £300 in case of explosion. While during the five years and a half only one guaranteed boiler had exploded, 279 explosions had occurred, killing 380 persons and injuring 473, among these boilers outside the ranks. There are, perhaps, 100,000 boilers in the kingdom. The great loss of life resulting from explosion points to the conclusion that coercion must be adopted, and that every boiler user should be compelled to have his boiler inspected. The system of inspection which Mr. Fletcher suggested was set forth in a document which he handed in to the committee, prefaced by the remark that the reference to the Board of Trade was not introduced willingly, but from necessity. The paper said: All boilers should be inspected and certified by a public authority, duly constituted for the purpose, with no other object in view than that of efficiently performing a public duty; it should therefore be enacted by parliament that, from a certain period, no boiler should be used which is not certified. The authority for carrying out the inspection of boilers, and granting certificates, should be a board constituted by act of parliament, to be called the Steam Boiler Commissioners, or by any other appropriate title. The first members would be nominated by the act, the board to be periodically recruited by new election, a proportion of the board going out yearly, biennially, triennially, or at stated periods, as may be considered advisable. The principle of popular election should be adopted as the basis for electing members of the board; the electors would be the proprietors of certified boilers. Candidates for vacancies to the board should be nominated by the electors, and when nominated, the Board of Trade should have a veto on the candidature. The election of candidates approved by the Board of Trade would be managed through the medium of voting papers transmitted through the general post office. The Board of Trade should have the power of introducing *ex-officio* members to the board. The proceedings of the board to be conducted according to regulations approved by the Board of Trade, in a manner analogous to the course now adopted for many other public boards. The board would have the power to appoint all appropriate officers. The whole cost of administration to be defrayed out of inspection and certificate fees, paid by boiler proprietors. These fees to be fixed by the board, subject to approval by the Board of Trade. The aggregate of these fees would form a fee fund, from which all expenses would be defrayed; the fees to be, from time to time, fixed according to the exigencies of expenditure. If at any time the fee fund is in excess of authorized expenditure, the surplus to be appropriated under the direction of the Board of Trade, subject to the sanction of Parliament. "That just gives the leading principle of the board as proposed; of course there are many points of detail arising upon that scheme." Scotland was left out of the proposal at present, but might be added if the plan answered. This board should insist on an entire examination annually. A boiler might be objected to for partial defects and have its certificate suspended, but after repair "certified" safe. It is a mistaken idea to suppose that explosions arise so much from ignorance or neglect of those who attend to boilers. A well appointed boiler can hardly be injured by any fault of the men. It was a total fallacy to suppose boiler insurance companies had a direct interest in preventing explosions. They tended to promote boiler explosions. The association has always avoided insurance principles. An insurance company had for its object a good dividend. If the total number of boilers in the kingdom were 100,000, and fifty explode each year, that is, 1 in 2,000, and £100 could be assured for 1s., experience showed that inspection costs 1s. per annum; but insurance should only cost 1s. if it was left alone, and that would make sufficient fund to pay £100 in case of explosion. The insurance companies last year had 10,000 boilers under them, and made 5,000 flue examinations, leaving 5,000 unexamined for which they took the money. Several cases may be mentioned where insured boilers have exploded which have never been examined in the flues, and were in a dangerously corroded condition. The insurance companies paid regularly 10 per cent., and the shares were up to £300, £400, and £500 premium.

—The New York Assembly has adopted a resolution after a long debate, directing the Attorney-General to prosecute all railroad companies that have not filed their annual reports, as required by law, at the time of the passage of the resolution.

Watering Stock.

Much has been said of late about the frequent increase of the capital stock of railroad companies in the shape of dividends to stockholders, sometimes to the extent of more than double the original capital and debt which represent the cost of construction. Mr. Rufus Hatch, a prominent stock broker in this city, has recently issued two circulars upon this subject, referring particularly to the route between New York and Chicago, embracing the New York Central & Hudson River, and Lake Shore & Michigan Southern roads.

Without indorsing the comments or conclusions contained in these circulars, we quote some of the figures, which may be of interest in this condensed form. In regard to the New York Central & Hudson River, the following statement is made of the several additions or "waterings" made to the capital stocks since 1866, in the shape of distributions to stockholders for which no value was paid:

First Watering of Hudson River.....	\$3,500,000	
First " of New York Central.....	23,000,000	\$24,536,000
Second Watering of Hudson River.....	13,623,800	
Second " of New York Central.....	8,524,400	\$22,483,900
Grand total.....		\$46,681,200

The present share capital of the consolidated roads, including the scrip dividend, is \$90,000,000. The waterings of Mr. Vanderbilt, consequently, exceed the capital actually paid in, by \$7,368,400.

The waterings in the line from Buffalo to Cleveland, a distance of 203 miles, equaled \$13,379,000, or \$65,906 per mile. The dividends upon this sum, at 8 per cent., amount to \$1,070,320, or at the rate of \$5,272, per mile annually.

The waterings in the Cleveland & Toledo Railroad as already shown, amounted to \$1,250,000. In addition to the above specific waterings, there was a general one, when the consolidation was entered into, to the extent of \$5,440,670. The amount of the share capital and debts of the several companies, according to these reports, immediately preceding their consolidation, was as follows:

	Share Capital.	Debts.
Michigan Southern.....	\$12,125,600	\$8,876,551
Lake Shore.....	15,197,700	5,649,000
Buffalo & Erie.....	6,000,000	4,000,000
Total.....	\$33,323,300	\$18,525,551

The total stock and debt of these lines previous to the consolidation was \$51,848,851. The consolidated capital was \$35,000,000. The funded and floating debt of the company, as stated in its first annual report made after the consolidation, deducting leased roads, was \$22,289,551. The two made an aggregate of \$57,289,551. The total watering in the whole line, consequently, equaled \$30,065,870, as follows:

Waterings in Cleveland, Painesville & Ashtabula.....	\$6,597,000
" Buffalo & Erie.....	6,718,300
" Cleveland & Toledo.....	1,350,000
Excess of new capital account over old.....	5,440,570
Total.....	\$20,065,870

"This was a year ago. The capital account of this company has since been increased to, probably, \$65,000,000, as provision was made, by the terms of consolidation, for a bonded debt of \$30,000,000. It is to be presumed that that amount has been wholly issued.

"As shown in the previous circular, the watering in the New York Central & Hudson River Railroad equaled \$57,578,900. The watering in the Lake Shore added to this sum makes a total of \$77,644,770. The dividends paid on this sum, at 8 per cent., equal \$6,211,725 annually. The waterings equal \$79,000 per mile, for the whole distance from New York to Chicago. The dividends paid equal \$6,325 annually, per mile, for the whole distance.

"The present charge for transporting freight over the line equals, say, two and one-half cents per ton per mile. Of this sum one and one-quarter cents per ton per mile represent cost of transportation, and one and one-quarter cents per ton per mile profits on capital. Admitting this rate of charge produces 8 per cent. upon \$163,000,000—the nominal cost of the road—then, if dividends were to be declared upon cost only—upon \$85,000,000—the charge for the capital might be reduced very nearly one-half, or five-eighths of a cent per ton per mile. In such case, the reduction per ton for the whole distance of 982 miles would be \$6.14."

It is not necessary, in considering these statements, to concur at all in the purpose or spirit with which they have been issued; but, so far as they concern the all-important subjects of railroad transportation, or the possible value of railroad property, they are worthy of most serious consideration. An examination of the history of other prominent lines would show that a similar increase of the original capital, though to a less extent, has been made in a number of instances.—*Commercial and Financial Chronicle*.

History of Railroad Cars.

Of the cars constructed between the years 1826 and 1850, we may first notice those made in 1830, and placed upon the Liverpool & Manchester (England) Railway. These cars had four wheels, but no springs, the bodies consisting of sills, to which the journal-boxes were bolted and upon which the floors were laid. From the sills stakes or posts arose, to which pieces of wood were attached, some longitudinally and some vertically; and these cars were formed without roofs, they being similar to those now used, and termed "rack-cars." In 1831, in October, one Mr. Joseph Knight proposed to employ springs under all cars, to support the body of the car and contents thereof. Mr. Knight also suggested an improvement in car wheels which entitles him to be ranked as amongst those who have excited our wonder, and who, by the exercise of his genius, has, more than most others, contributed to the successful operation of railroad cars. The improvement suggested at this time was that the treads of car-wheels should be made conical, for the purpose of facilitating

their passage around the curves of the road. How important this suggestion was all now fully realize, and it is not regarded as saying too much that, up to this time, no more important improvement has been made, which has referred to railroad cars, in this or any other country.

In 1860, cars for the transportation of passengers in England and Scotland consisted of three classes, the first-class being well finished and provided with seats for the passengers to sit upon, which seats were furnished with cushions. The second-class were of plain finish, without cushions or ornaments. The third-class were little more than plain boxes set upon wheels and supplied with seats, but in many cases had no roof. In addition to these three classes, there were what were termed "mixed carriages," which were designated by names, and consisted of three compartments, the center one being for first-class passengers, and the two end ones for second-class passengers.

The next novelty which will be mentioned in the way of passenger cars was introduced in the year 1847, by a Mr. Hanson, of England, and consisted of a compartment car, the body of which was iron, and constructed as follows: In each of the partitions there was placed a hoop of iron, which was bound together by two cross-stays, one of which connected the roof to the floor. To this frame-work a sheet or sheets of iron were riveted, a sheet of felt being placed between the heads of the rivets and the sheets of metal. These cars had only one seat in each compartment, it being so arranged that the faces of the occupants could always be in the direction in which the car was moving. At the bottom of the car there were arranged boards for resting the feet upon, which consisted of an upper and underpiece, with a space between the two into which to thrust the feet, the inner surfaces being covered with sheepskin with the wool on it, the object being to provide for keeping the feet of the passenger warm during the time of his occupying the seat. At about the height of the faces of the passengers there was placed a head-board or cushion, formed of sponge, and covered with leather or cloth, so that, in the event of any sudden shock upon the cars, the head of the occupant would be brought in contact with the cushion, and thus, to some extent, be saved from injury.

A freight car, introduced at the same time and by the same inventor, was of the same general construction, except that its interior was arranged for the reception of freight, and a portion of its roof was made to slide upon rods over or under the fixed portion, the object being to provide for the reception and discharge of the goods through the roof of the car.

In the same year, 1847, a very decided novelty in the shape of a car wheel made its appearance in England, which consisted of a wrought iron wheel, which was made in sections, a portion of the hub and rim comprising each section, and parts being joined together by means of tongues and grooves formed thereon as the sections were made, and each being provided with a projection upon the outer segmental surfaces to enter a groove formed in the entire surface of the tire. The hole in the hub of the wheel for the reception of the axle was bored larger than the axle, so as to leave room for the insertion of an expanding ring, the insertion of which was to fit the axle, while its exterior was conical in form, so that, as it was forced inward, the segments would be forced outward, and thus tightened within the tire, the cone being held in place by a ring, which was cast in two parts, and placed in a groove turned in the axle.

At about the time of the last-named date, in contracting for the passenger cars to be run upon the road leading from Strasbourg to Basle, in France, it was stipulated that the roofs, partitions and seats were to be made of American pine, three-fourths of an inch in thickness, and that the roofs were to be covered with three pieces of leather, weighing at least thirty-eight pounds each.—*National Car Builder*.

The Safety of Railroad Traveling.

Mark Twain in the February *Galaxy* discourses as follows of accident insurance:

The man in the ticket office said:
"Have an accident insurance ticket, also?"
"No," I said, after studying the matter over a little.
"No, I believe not; I am going to be traveling by rail all day to-day. However, to-morrow I don't travel. Give me one for to-morrow."
The man looked puzzled. He said:
"But it is for accident insurance, and if you are going to travel by rail—"
"If I am going to travel by rail, I shan't need it. Lying in bed at home is the thing I am afraid of."

I had been looking into this matter. Last year I traveled twenty thousand miles, almost entirely by rail; the year before, I traveled over twenty-five thousand miles, half by sea and half by rail; and the year before that I traveled in the neighborhood of ten thousand miles, exclusively by rail. I suppose if I put in all the little odd journeys here and there, I may say I have traveled sixty thousand miles during the three years I have mentioned. And never an accident.

For a good while I said to myself every morning: "Now I have escaped thus far, and so the chances are just that much increased that I shall catch it this time. I will be shrewd, and buy an accident ticket." And to a dead moral certainty I drew a blank, and went to bed that night without a joint started or a bone splintered. I got tired of that sort of daily bother, and fell to buying accident tickets that were good for a month. I said to myself, "A man can't buy thirty blanks in one bundle."

But I was mistaken. There was never a prize in the lot. I could read of railway accidents every day—the newspaper atmosphere was foggy with them; but somehow they never came in my way. I found I had spent a good deal of money in the accident business, and had nothing to show for it. My suspicions were

aroused, and I began to hunt around for somebody that had won in this lottery. I found plenty of people who had invested, but not an individual that had ever had an accident or made a cent. I stopped buying accident tickets and went to ciphering. The result was astounding. The peril lay not in traveling, but in staying at home.

I hunted up statistics, and was amazed to find that after all the glaring newspaper headings concerning railroad disasters, less than three hundred people had really lost their lives by those disasters in the preceding twelve months. The Erie road is set down as the most murderous in the list. It had killed forty-six—or twenty-six, I do not exactly remember which, but I know the number was double that of any other road. But the fact straightway suggested itself that the Erie was an immensely long road, and did more business than any other line in the country; so the double number of killed ceased to be a matter of surprise.

By further figuring, it appeared that between New York and Rochester the Erie ran eight passenger trains each way every day—sixteen altogether; and carried a daily average of 6,000 persons. That is about a million in six months—the population of New York city. Well, the Erie kills from thirteen to twenty-three persons out of its million in six months, and in the same time 13,000 of New York's million die in their beds! My flesh crept, my hair stood on end. "This is appalling!" I said. "The danger isn't in traveling by rail, but in trusting to those deadly beds. I will never sleep in a bed again."

I had figured on considerably less than one-half the length of the Erie road. It was plain that the entire road must transport at least eleven or twelve thousand people every day. There are many short roads running out of Boston that do fully half as much; a great many such roads. There are many roads scattered about the Union that do a prodigious passenger business. Therefore it was fair to presume that an average of 2,500 passengers a day for each road in the country would be about correct. There are 846 railway lines in our country, and 846 times 2,500 are 2,115,000. So the railways of America move more than two millions of people every day; six hundred and fifty millions of people a year, without counting the Sundays. They do that, too—there is no question about it; though where they get the raw material is clear beyond the jurisdiction of my arithmetic; for I have hunted the census through and through, and I find that there are not that many people in the United States, by a matter of 610,000,000, at the very least. They must use some of the same people over again, likely.

San Francisco is one-eighth as populous as New York; there are sixty deaths a week in the former and 500 a week in the latter—if they have luck. That is 3,120 deaths a year in San Francisco, and eight times as many in New York—say about 25,000 or 26,000. The health of the two places is the same. So we will let it stand as a fair presumption that this will hold good all over the country, and that consequently 25,000 out of every million of people we have must die every year. That amounts to one-fortieth of our total population. One million of us, then, die annually. Out of this million ten or twelve thousand are stabbed, shot, drowned, hanged, poisoned, or meet a similarly violent death in some other popular way, such as perishing by kero-sene lamp and hoop skirt conflagrations, getting buried in coal mines, falling off house tops, breaking through church or lecture-room floors, taking patent medicines, or committing suicide in other forms. The Erie Railroad kills from twenty-three to forty-six; the other 845 railroads kill an average of one-third of a man each; and the rest of that million, amounting in the aggregate to the appalling figure of nine hundred and eighty-seven thousand six hundred and thirty-one corpses, die naturally in their beds!

You will excuse me from taking any more chances on those beds. The railroads are good enough for me!

And my advice to all people is, Don't stay at home any more than you can help; but when you have got to stay at home a while, buy a package of insurance tickets, and sit up nights. You cannot be too cautious.

[One can now see why I answered that ticket agent in the manner recorded at the top of this sketch.]

The moral of this composition is that thoughtless people grumble more than is fair about railroad management in the United States. When we consider every day and night of the year full fourteen thousand railway trains of various kinds, freighted with life and armed with death, go thundering along over the land, the marvel is, not that they kill three hundred human beings in a twelve month, but that they do not kill three hundred times three hundred!

—The Cleveland *Herald* reports an extraordinary telegraphic feat performed by Mr. Henry W. Stager, Train Dispatcher at Cleveland for the Lake Shore & Michigan Southern Railway. During fourteen days he sent to conductors of trains on that division 6,951 "train orders." Each order averaged 25 words and each word five letters, making the number of words sent 173,775, and of letters, 868,875. Each message, to guard against error, was repeated back to Cleveland. The average time consumed in the transmission and repeating of each "order" was two minutes, thereby making the length of time occupied in the continuous working of the wire a little over ten days and nights.

—Mr. J. H. Blood has concluded a contract with Jackson & Sharp, of Wilmington, N. J., for two magnificent day cars, furnished with Blood's patent adjustable seats, which were illustrated in the RAILROAD GAZETTE some time ago, to run on the St. Louis & Iron Mountain Railroad. These seats are now used on the Hannibal & St. Joseph, the Kansas Pacific, the New Orleans, Jackson & Great Northern, and the Iron Mountain roads. An agency for these seats has been established in Chicago.

General Railroad News.

OLD AND NEW ROADS.

Indianapolis, Cincinnati & Lafayette.

There was a meeting of the creditors of this company at Cincinnati on the 19th ult. at which about one hundred, representing one fourth of the floating debt of the road, were present. The President, Mr. Ingalls, of Boston, submitted a statement showing that this floating debt amounts to about \$1,400,000, and that the company has no means to meet any material part of it. He said that the directors were ready, however, to make a new issue of 7 per cent. bonds to cover these claims. A committee of creditors which conferred with the directors reported the following as a plan of settlement, which it is understood is generally approved:

1st. A million of dollars of bonds to be issued, to be secured by a mortgage upon the company's property, and having twenty years to run, to bear seven per cent. interest, and to be dated on the 1st day of May, 1871.

2d. The claims are to be made up with principal and interest, to November 1st, 1871, and the coupons upon these bonds for interest up to that time to be cut off and surrendered to the company.

3d. The creditors are to take these securities at ninety cents on the dollar.

4th. The mortgage by which these bonds are to be secured, shall be made to two trustees, the company and the creditors each naming one.

5th. The mortgage is to contain a provision that in case of default in the payment of the interest for the period of sixty days, the bondholders may take possession of the road and operate it.

6th. A sinking fund of \$5,000 a year is to be provided for, which the trustees shall invest, and to be used in retiring these bonds from time to time, or at maturity.

7th. And the same penalty is provided for, in the default of the regular payment of the sinking fund, as that for the default in the payment of the interest upon the bonds.

8th. To render this proposition obligatory, \$750,000 of the credit interest must approve of it within ninety days from its date.

9th. The bonds may be exchanged for stock of the road.

Central of Iowa.

The company have completed its line as far south as Albia, on the Burlington & Missouri River road, is now preparing to extend it to a connection with the North Missouri at Moulton. The Centerville Citizen says the agent has asked the citizens of Washington township to aid the road by voting a tax of 5 per cent., a total of \$10,000, promising, if that shall be done, that the road will be completed to Moulton by August next. The same gentleman visited Douglas and Taylor townships and informed the people that the 5 per cent. tax must be forthcoming or the Central could not put down the iron, although the road-bed is graded through from Albia to Moulton.

Cincinnati and the Chesapeake & Ohio.

The Cincinnati Railroad Record, which is always alive to the railroad interests of Cincinnati and with admirable pluck continues to urge the construction of certain much needed lines notwithstanding all discouragements, in view of the completion of the Chesapeake & Ohio Railroad to the Ohio River, an event that is likely to occur within eighteen months, urges the formation of a company that will construct a line from Cincinnati to meet this Virginia road, especially as other Ohio companies are preparing to construct lines which will connect it with St. Louis, Chicago and the Lakes, by the time it is completed.

Columbus & Hocking Valley.

The annual stockholders' meeting was held on the 25th ultimo. From the President's report we find that during the year 1870 the road has been completed to Athens, (76 miles) and a branch road extended to Straitsville from Logan (13 miles). The reports for the year show less than a half year's business for the whole road, as the line was not opened to Athens until July 25th, and the Straitsville branch was not opened until the 2d of January last. Notwithstanding certain disadvantages, such as strikes among the miners, a flood on the Scioto, etc., the net earnings of the road during 1870 amounted to \$210,914, which is equal to the interest on the bonds of the company, and ten per cent. on all the stock issued.

Missouri River, Fort Scott & Gulf.

The Fort Scott Monitor says that "during the whole time the road has been operated no serious accident has occurred, and no instance of a mishap is on record that could be attributed to bad condition of track or negligence of employes."

During forty days, in December and January, nearly

9,000 tons of freight, mostly coal, were shipped from Fort Scott, independent of the freights passing through that point.

Seymour, Sandusky & Evansville.

A correspondent writes us that at a late meeting of the company at Seymour, Indiana, Mr. Robert McLeod, Chief Engineer, was directed to complete the estimate of surveys made last fall. The work is to be put under contract, early on the spring. This line passes through College Corners on the eastern border of Indiana, Brookville on the White Water Valley Railroad, Seymour at the crossing of the Ohio & Mississippi and Jeffersonville, Madison & Indianapolis railroads and Evansville in the southwestern part of the State.

Gilman, Clinton & Springfield.

According to the Gilman Star, sixty car loads of iron were last week at that place and forty more were daily expected. Upon the arrival of these, track laying was to commence at once. The company has a construction train ready, and when the work is once begun but little time will be required to complete the job.

Atchison & Nebraska.

Trains now run regularly between White Cloud and Atchison, arriving at Atchison at 9:50 in the morning and departing at 4:15 in the afternoon. Arrangements have been made with the St. Joseph & Denver road, by which freight may be shipped from Atchison to any point on that road without breaking bulk.

Mobile & Northwestern.

This company is trying to obtain the means for the construction of a line from Mobile northward, chiefly in Mississippi through Jackson and thence nearly due north across the Yazoo valley to a point opposite Helena, Arkansas, with a branch reaching the Mississippi opposite Napoleon, about 50 miles south of Helena. The distance to Jackson is 166 miles, to Yazoo 200, Helena, Ark., 320; the branch to Napoleon 60 miles. To Jackson the route is through pine woods, similar to those all along the South Atlantic coast, with considerable timber and naval stores, but a very poor soil and sparse population. Most of the distance above Jackson is through the fertile Yazoo valley, very productive, but as yet not half occupied and cultivated.

Cincinnati & Dayton Short Line.

Important action was taken last week by two of the companies who are interested in the building of this road, by means of which a through line is to be secured from Cincinnati to Buffalo and the East, by way of Dayton, Springfield, Delaware and Cleveland. The stockholders of the Sandusky & Cleveland Company have ratified a contract granting to the Cincinnati & Springfield Company a running and business arrangement over twenty-five miles of their road, from Dayton to Springfield. The Cleveland, Columbus, Cincinnati & Indianapolis Company have assented to a contract which is also to be signed by the Lake Shore & Michigan Southern and Cincinnati & Springfield companies, and which specifies that the Cincinnati & Springfield Company shall build or lease a road between the points indicated in their title. Twenty-five miles of this "short line" is arranged for by the action of the Sandusky Company, leaving about sixty miles, from Dayton to Cincinnati, over which a new road will probably be built. The bonds for the construction of the Cincinnati & Springfield Short Line, not to exceed two millions of dollars, are to be guaranteed by the Lake Shore and the Cleveland, Columbus, Cincinnati & Indianapolis companies, an equal amount by each, and the road, when completed, is to be leased to, and at the end of ten years consolidated with, the Indianapolis Company. The lessee is to furnish rolling stock, not exceeding \$500,000 in value; make a semi-annual statement of the operation of the leased line; and apply the gross earnings to pay operating expenses, maintenance; renewals, taxes, etc., and the interest on the bonds indorsed by the two companies. The Indianapolis Company is to receive seven per cent. mortgage bonds at par in payment for the rolling stock supplied. In the event of the gross receipts of the leased line being less than the expenses, the lessee will supply the deficiency and reimburse itself out of future earnings. Provision is also made for additions and improvements, and, when necessary, the building of a double track over the short line by the Indianapolis Company, for which the latter company is to receive the leased line's bonds at market value, but not less than ninety cents on the dollar. The capital stock of the Cincinnati & Springfield Railway Company is not to exceed two millions dollars, including the \$500,000 bonds for rolling stock. Of the receipts on through business between Cleveland and Cincinnati, 64 per cent. accrues to the Indianapolis Company and 36 per cent. to the Springfield Company.

The distance from Cleveland to Cincinnati by this new route will be less than two hundred and fifty miles,

making a shorter line than any now existing, and affording the Lake Shore and the Indianapolis companies an independent connection with Cincinnati, which they have not hitherto had, and giving, too, to Cincinnati an outlet by rail other than that controlled by the Pennsylvania Company.

Ware River.

The Boston Advertiser says: "The grading of the fourth section of the Ware River Railroad, by Messrs. Kay & Co., up to the present time has been pushed forward with commendable alacrity; but there is a hitch in the financial affairs of Kay & Co., and last week Tuesday work on the road by them was suspended, the elder Kay, it is said, having disappeared with a considerable sum recently paid them by Messrs. Smith, Cotton & Co. to pay off the laborers. A man by the name of Mills is said to have engaged to finish up the grading as soon as possible."

Missouri, Kansas & Texas.

When we last heard from this road there remained but ten miles of track-laying to be done on the Sedalia Branch to complete it to the junction of the two divisions at Parsons. It was expected that this would be completed on the 1st inst.

The Fort Scott Monitor learns from Mr. O. B. Gunn, Chief Engineer, that he intends to complete the Indian Territory line to the Arkansas River, at Fort Gibson, by the 1st of May next. The pioneer surveying party is, or was, near Austin, Texas.

Holliday's Cove to Wellsburgh.

Proposals are asked for building a part of this road, from Wellsburgh, West Va., just north of Wheeling, north about ten miles to Holliday's Cove. Proposals will be received until the first of March.

Milwaukee & St. Paul.

The Upper Des Moines, published at Algona, Iowa, says that this company will not extend their Iowa & Dakota line beyond that place for a year at least.

Sabula, Ackley & Dakota.

Twenty miles of this road, from Sabula westward to Preston, are completed, and ten miles more are nearly ready for the iron. There is a report that the line will not be extended according to the original survey, but will be diverted southward, crossing the Iowa Midland not far from Maquoketa. The report that work has been suspended for want of means is denied.

Columbus to Chetopa.

This Kansas road, of from 20 to 25 miles, branching from the Missouri River, Fort Scott & Gulf Railroad at Columbus, has been under consideration for a year past, and now for the first time comes some definite information concerning its prospects, in the shape of a letter from Mr. Joy, addressed to a citizen of Chetopa, dated January 5, 1871, in which he says:

"The letters which I receive from Boston, in answer to my communication relative to the proposition of your place for a road to Columbus, indicate that the proposition will be accepted.

"Though probably it will be necessary for me to go there again, which I cannot do just now, being compelled to go West first. As soon as I can meet them the thing shall be disposed of and you informed. Meantime there appears to be not much doubt of it."

Athol & Enfield.

The Springfield Republican says: "Willis Phelps has 150 hands sharp at work this cold weather constructing the Athol & Enfield Railroad. The mason work is well along; 25 of the 30 miles from Athol to Palmer are graded; the rails are shipped from Wales, and will be here in March; putting down the tracks will begin in April, and the work from Athol to Enfield will be completed in June. H. W. Phelps has men distributed all over the Lowell and Framingham route of 26 miles and will have that road finished in the summer."

Burlington, Cedar Rapids & Minnesota.

On the 27th ult. the connecting link, south of Cedar Rapids, between the northern and southern divisions of this road was finished, making a continuous line of about 170 miles from Burlington to Cedar Falls, crossing the Chicago & Southwestern at Columbus Junction; the Chicago, Rock Island & Pacific at West Liberty; the Chicago & Northwestern's Iowa line at Cedar Rapids; the Iowa Division of the Illinois Central at Waterloo; and, at Cedar Falls, meeting the line of the Illinois Central which continues from there north to the State line.

Denver & Boulder Valley.

This road, 15 miles long, from Hughes Station, on the Denver Pacific road, to Erie, was finished on the 24th ult., exactly three months from the date of the commencement of the work. The company was organized in October, 1870, with a capital stock of \$1,000,000 and bonds were issued to the amount of \$300,000, guaranteed by the Denver Pacific, to which company the road has been leased. The contractors

were Messrs. Robert E. Carr, of St. Louis and D. H. Moffat, Jr. The following is its board of officers: President, Hon. Jerome B. Chaffee; Vice-President, W. S. Cheesman; Secretary, R. R. McCormick; Treasurer, D. H. Moffat, Jr.; Directors, John Evans, J. B. Chaffee, D. H. Moffat, Jr., W. S. Cheesman, P. M. Housell, Granville Burkley and General W. J. Palmer.

Wisconsin Railroad Projects.

A Wisconsin correspondent of the *Boston Advertiser* mentions, among the projected roads of that State, the St. Croix & Bayfield Railroad, which is to run from St. Croix to Bayfield, on Lake Superior; the Milwaukee & Northern, which is to commence at Milwaukee, and extend almost in a direct line, in a northwesterly direction, to Green Bay; the Ripon & Oshkosh Railroad, a short road to connect those two points; the Portage, Winnebago & Superior Railroad, commencing at Superior, at the western end of Lake Superior, will run to Bayfield, and thence to Stevens Point, where it will divide into two branches, one going south and terminating at Portage City, and the other east, and terminating at Doty's Island; and the Manitowoc & Minnesota Railroad, which has the right to build from Manitowoc, on Lake Michigan, west to the Mississippi River. The last two mentioned are now in the hands of one company, and, I understand, are to be consolidated under the name of the 'Wisconsin Central Railroad.' * *

* Whether this road will have its lake terminus at Manitowoc or Sheboygan, I believe is a matter of some doubt, and depends very much upon the enthusiasm with which these towns enter into the project.

Wisconsin Central.

A bill has passed in the Wisconsin Senate changing the name of the Portage, Winnebago & Superior Railroad Company to the "Wisconsin Central Railroad Company,"—a very appropriate name.

Atlantic & Lake Erie.

We learn from the annual report, signed by the President, Mr. D. W. Swigart, of Bucyrus, O., that on the 5th day of May, 1870, a contract was concluded with Messrs. Huston, Wright & Co., for the graduation, masonry, bridging, and for furnishing iron, ties, and other material, and laying track on that portion of the company's road lying between the north line of Athens County and the Pittsburgh, Fort Wayne & Chicago Railway, at or near Bucyrus. On the 23d day of June following, the contractors broke ground at New Lexington, and since that time the work of construction on the tunnel sections in Perry County, has gone steadily forward. On the 26th day of August, a contract for the substructure between Bucyrus and Toledo was made by Messrs. B. B. McDonald & Co. Since the contracts referred to were concluded, the entire line from Chauncey to Toledo has been resurveyed, and the grades, curvature, and cost of superstructure very much improved and lessened.

The line is to extend from Toledo southeastward to Pomeroy, a town on the Ohio River, nearly due south of Cleveland, and about fifteen miles north of the Great Kanawha. Subscriptions have been made nearly sufficient to pay the cost of the road-bed.

Springfield & Illinois Southeastern.

The northwestern extension of this line from Springfield is now completed to Ashland, on the Jacksonville Division of the Chicago & Alton road, a distance of twenty miles, and trains will commence running regularly next Monday. It will very soon be completed to Virginia, on the Peoria, Pekin & Jacksonville road, twelve miles further.

Chicago & Iowa.

A telegram from Aurora, Ill., says that five routes have been surveyed for the railroad from Aurora to Joliet, three by way of Lockport and two through Plainfield to Joliet direct. A surveying corps started last Tuesday to locate a line from Oregon, Ogle County, to the Mississippi River. Both of these lines are a continuation of the Chicago & Iowa Railroad.

Tehuantepec Railroad.

Colonel J. J. Williams, Chief Engineer of the Tehuantepec Railroad Company under date of January 20, telegraphs from Minatitlan, Mexico, to the President of the company, at New York as follows:

"Myself and staff of engineers, with our instruments and camp equipage, were all safely landed from the United States steamship Nipsic after a very rough passage. The next day I met with the Commissioner representing the Mexican Government, and, on the 9th inst., we inaugurated the commencement of the work by imposing ceremonies. The United States Consul and part of Captain Shufeldt's command participated in the ceremonies, together with the Mexican officers and other notables. The official certificate of my proceedings at the commencement of the works, properly attested, has been dispatched by mail and by courier to the Mexican Government. The United States Consul,

under instructions, has forwarded an official certificate to the Department of State at Washington. Captain Shufeldt's report, I think you will find, confirms my previous surveys of the Isthmus, and the demonstration that there is a sufficient quantity of water on our summit route all the year round for the purposes of the canal."

New York & New Orleans.

The following is the fast-time schedule for trains between New York and New Orleans, adopted at the Augusta Convention the first of last month, which went into operation on the 22d ult:

Going North—leave New Orleans at 3 p. m.; arrive at Mobile at 9 p. m.; at Montgomery at 11:15 a. m.; at Augusta at 7:40 a. m.; at Washington city at 7:30 p. m.; at New York at 6:30 a. m.—early morning train into New York. Coming South—leave New York at 9:30 p. m.; arrive at Washington city at 6:30 a. m.; at Augusta at 7:45 p. m.; Montgomery, 5:45 p. m.; Mobile, 8 a. m.; New Orleans, 2 p. m.

By this schedule the time is 20 hours shorter than heretofore, and it is believed that this will attract some of the travel that has heretofore gone by the more direct Louisville route.

MECHANICS AND ENGINEERING.

A Complaint against Car Seats.

The railroad travel of the world, at least of our part of it, needs a newer and better basis than has been furnished hitherto in the uncomfortable cars into which the great majority of passengers are thrust and cribbed. To most people, these car-seats are but one remove from the stocks or the pillory, and, in the present form, no amount of cushioning appears to help them or their occupant. They are too straight-backed and too flat-seated to make comfort possible, while the foot-holding arrangements are unworthy of the least confidence as conducive to enjoyment. Next to the berths of an old-style canal-boat, we must rank the inevitable railroad-car seat as a miracle of misery. To be sure, that these square boxes are cushioned at all should be, we suppose, cause of gratitude; but we can imagine a differently-shaped seat, which, even without upholstery might prove to be "tired nature's sweet restorer." Taking the benches, scattered so invitingly through the Central Park, as a model, we see no reason why something of this sort, fitting the form of the occupant, might not be adapted for railroad travel. In most other respects the railway officials have shown signs of progress as years rolled on; but there has been a woeful lack of enterprise manifested in the direction of seating passengers comfortably. Varnish and paint and gilding are well enough in their place, but a weary traveler would willingly trade them all off for a firm clutch upon that *ignis fatuus* of the railway—an easy, enjoyable seat.—*New York Times*.

Sanding and Cleaning Tracks.

Of course, in running locomotives, the best working condition of a good track is that which affords the greatest hold to the engine wheels and the least resistance by roughness to those of the cars coming after. The first of these essentials, when the track is unduly smooth for the requirements of traction, is met by the use of the common sand-box, which, however, has the demerit of detracting from the second requisite just named. This suggests the propriety of removing the sand from the rails after the passage of the engine and before that of the cars. Rotating brushes applied at the rear of the engine, and sweeping the track, would only last for a little while, and the gearing required to operate them would be objectionable to engineers. Recourse being had to other means, we notice the project of a Boston gentleman, whose idea is to eject jets of dry steam from the boiler upon the track to blow off the sand. With all due deference to those who have favorably noticed the alleged improvement, we must express doubt of its utility. Dry steam is an expensive thing to blow with. Would not an air-blast be better? And could it not be applied with means nearly or quite as simple as those required for the steam-jet? At all events, the subject seems worthy of attention. Devices of the character indicated, although of minor importance compared to some others still acknowledged to be incomplete in railway engineering, belong to a class cheaply and easily applied, and once widely adopted, very commonly remunerative to their owners.—*American Artisan*.

Central Pacific Wharf in San Francisco Bay.

The San Francisco *Alta California*, of January 17, says: "A wharf, 11,000 feet long, running out to a depth of 24 feet at low tide, and of 31 feet at high tide, in a bay like that of San Francisco, having 12 railroad tracks upon its last 1,000 feet, a wide carriage-way, a spacious passenger depot, and railroad offices, warehouses, and outside storage for 40,000 tons of grain or

other merchandise, three large docks, one of which affords ample space for five of the largest steamers or clippers afloat, is not often seen, even in this age of railroad and engineering wonders. Such a structure has been completed by the Central Pacific Railroad Company on the Oakland or east side of the Bay of San Francisco. The extreme end of the main wharf is only three miles from the foot of Second street, where freight is landed in this city, and is less than $2\frac{1}{2}$ miles from the foot of Pacific street, where passengers are set down on this side. It would be much more difficult to build such a long wharf with safety on our side of the bay, because the bottom here is a yielding mud, but on the Oakland side there is a hard clay bottom. Nothing has been neglected in the quality of material used and workmanship employed to make the wharves the very best ever built in the United States. Experts in the construction of such work, army and other engineers, who are familiar with like structures in Europe and America, all agree in saying that, for engineering skill, mechanical execution, and solidity and excellence of all the material employed, the work is not surpassed by any they ever examined. The piles used, where the water deepens, are 65 feet long, and are 42 to 54 inches in circumference, or as heavy as the mainmast to the largest clipper. They are all of the very best pine, which, for lasting qualities under the water, is one of the best kinds of wood. The main wharf—for 1,000 feet east of the latter there are two wharves, one for Oakland local trains, and one for the regular freight and passenger cars of the through overland road—is 800 feet wide at the extreme or western end, and on it are pens for 500 cattle, two immense warehouses (one 50x500, another 50x600), with the passenger depot, 75x305 in size. The piles were driven into the bottom to a depth of 18 feet. They are set 10 feet apart, parallel with the course of the wharf, and 6 and 7 feet apart across it. In the docks, or slips, there is a double row of spring or fend-off piles, and the regularity and neatness with which they are laid is especially worthy of attention."

Elevated Railroads.

A Railway "Traveler, Constructor, and Director," writes in the London *Times*: "Progress is rapid in these and railways have not attained perfection. New days, propelling powers will be discovered by the advancement of science, and I shall probably be set down as a wild enthusiast if I venture to prognosticate that in another generation our passenger carriages, instead of having their load placed above the centre of gravity, will be suspended below that centre by the elevation of the rails, by which accelerated speed will be obtained with greater safety than on the present system. But neither directors nor travelers are yet prepared for that sweeping but certain change. They are, however, I believe, prepared that we shall have a line for human beings, and another for luggage, upon our leading, and, I will add, generally well-conducted and well-managed lines. For the thought is not pleasant that we may be burnt, as at Abergele, or precipitated down an embankment, as at Tamworth, by the blundering negligence of a careless pointsman."

Locomotive for Elevated Railroad.

An exchange says that the Albany Street Iron Works, New York, have recently completed a dummy engine, which has been placed on the Greenwich Street Elevated Railway, and with its supply of water weighs only 3,500 pounds. One car is attached to this engine in such a manner as to make the dummy sustain part of the weight of the passengers.

Fast Trains in England.

A correspondent of the *English Mechanic* says: "In the Trent affair, the special left Holyhead at 8:15 a. m., arrived at Stafford 10:38 a. m.; left ditto at 10:41 a. m., arrived at Euston 1:16 p. m., delayed two minutes at Rugby; slackened at Kilburn, came to a stand at Primrose Hill Tunnel by signals. Distance from Holyhead to Euston, 263 $\frac{1}{2}$ miles, or at the rate of a little over 53 miles per hour. From London Bridge to Brighton is 50 miles 49 chains. The fastest trains are allowed 1 hour 15 minutes. Formerly an hour was the time, but the annuals complained of the shaking. I have been from Swindon to Paddington—77 miles—in 73 minutes."

TRAFFIC AND EARNINGS.

—The earnings of the New Jersey Southern Railroad for the six months ending December 31, 1870, were \$292,261.41, against \$166,514.31, for the corresponding period of the previous year—an increase of \$125,747.10, or about 78 per cent.

—The traffic receipts of the Grand Trunk of Canada for the week ending January 7 amounted to £28,400, against £24,900 in the corresponding week of last year, showing an increase of £3,500.

—The traffic receipts of the Great Western of Canada for the week ending January 6 amounted to £15,292, against £13,447 in the corresponding week in last year, showing an increase of £1,845.

ELECTIONS AND APPOINTMENTS.

—A meeting of the stockholders of the Chicago & Rock River Railroad Company was held at Sterling, Ill., a few days ago, at which the following directors were elected: Wm. Hanley, Lockport; S. R. Ashley, Plainfield; Jas. M. Gale, Bristol; G. N. Chittenden, Plainfield; A. Kinyon, Amboy; A. P. Smith, Rock Falls; H. E. Badger, Amboy; A. Wheeler, Rock Falls; M. B. Castle, Sandwich; O. P. Johnson, Melugin's Grove; R. M. Fritchard, Shabbona; Simon Elliot, Dover; S. W. Hopkins, New York (contractor). Judge Kenyon was made President; J. M. Gale, Treasurer, and A. P. Smith, Vice-President.

—John T. Wilson, (formerly of Aurora, Ill.), who has been lately Assistant Master Mechanic on the Union Pacific, has lately accepted a similar position on the Central Pacific at Carlin, Nev.

—At the annual meeting of the Columbus and Hocking Valley Railroad Company, held on the 24th ult., the old directors were re-elected, with the addition of John L. Gill, of the Columbus Car Wheel Works, to fill a vacancy that existed. The board now consists of W. B. Brooks, C. P. L. Butler, Theo. Comstock, Wm. Denison, W. G. Deshler, Isaac Eberly, John L. Gill, M. M. Green, John Greenleaf and B. E. Smith, of Columbus; John D. Martin, of Lancaster; C. H. Rippey, of Logan, and S. W. Pickering, of Athens. At a meeting of the directors the old officers of the road were re-elected, viz: B. E. Smith, President; M. M. Green, Vice President; J. J. Janney, Secretary and Treasurer, and John W. Doherty, Superintendent.

—General Marshall Lefferts has resigned his position as Engineer of the Western Union Telegraph to accept the Presidency of the Gold and Stock Telegraph Company of New York.

—N. G. Hickborn has been elected President, H. Heriman, Clerk, and C. Gordon, Treasurer, of the Penobscot Bay & River Railroad Company. The office of the company is at Belfast, Me. The length of the road is fifty miles, extending from Rockland to Winterport.

LOCOMOTIVE STATISTICS.

Missouri River, Fort Scott & Gulf.

From the first annual statement of locomotive performance on this road, for the year 1870, by Mr. J. S. McCrum, Master Mechanic, we find:

Number of miles run by

Passenger trains.....	144,387
Freight ".....	225,668
Construction trains.....	90,659
Switching.....	114,385
Total.....	574,909

The cost per mile run was for

Oil, waste and tallow.....	0.7 cts.
Fuel.....	5.8 "
Engineers, firemen and wipers.....	8.1 "
Repairs.....	2.8 "

Total cost per mile run..... 17.4 cts.

Number of miles run to one

Pint of oil.....	66.3
Ton of coal.....	30.0

Of the 22 locomotives belonging to the company, all but one were built at the Manchester Locomotive Works; have 16x24 in. cylinders; weigh 33 tons; and all but two have 5 feet drivers. One 25 ton locomotive, 15x18 in. cylinders, was built by Hinkley & Drury. The length of road operated is 159 miles.

Illinois Central.

The report of S. J. Hayes, Superintendent of Machinery of the Illinois Central Railroad, for the month of November, 1870, affords the following:

Passenger trains.....	101,677
Freight.....	301,582
Construction, etc.....	12,486
Switching.....	55,569

Total..... 480,364

The cost per mile run was:

For oil and waste.....	0.88 cts.
For fuel.....	7.54 "
For engineers and firemen.....	5.90 "
For cleaning.....	1.02 "
For repairs.....	8.86 "

Total..... 34.14 cts.

Cost per mile run, in cents:

Passenger engines.....	18.44 cts.
Freight engines.....	26.40 "
Construction engines.....	17.10 "
Switching engines.....	14.89 "

Average number of miles run to

Pint of oil.....	13.29
Ton of coal.....	32.37

One hundred and eighty-one locomotives made mileage during the month. This report is for 974 miles operated. Five locomotives have had general or thorough repairs, and eight are undergoing repairs.

THE ERIE RAILWAY COMPANY.

The Annual Report for 1870—Statement of the Earnings and Expenses—An Interesting Exhibit for the Stockholders.

The annual report of the Erie Railway Company for one year ending September 30, 1870, has been made to the State Engineer at Albany. The following are the principal items in the statement:

Length of the road—Jersey City to Dunkirk, miles.....	429
Length of road laid, miles.....	459
Length of double track, including sidings.....	339 1/2
Length of branches owned by the company, laid.....	364 1/2
Length of double track on same.....	90
Weight of rail per yard on main track, lbs.....	64 to 70
Number of engine houses and shops.....	40
Number of engines.....	440
Number of first-class passenger cars (rated as eight-wheeled cars).....	220
Number of second-class and emigrant passenger cars (rated as eight-wheeled cars).....	54
Number of baggage, mail and express cars (rated as eight-wheeled cars).....	71
Number of freight cars (rated as eight-wheeled cars).....	8,840

The doings of the year in transportation and total miles run were as follows:

Miles run by passenger trains.....	2,900,199
Miles run by express trains.....	6,436,190
Passengers (all classes) carried.....	3,275,025
Miles traveled by passengers.....	185,589,109
Tons, of 2,000 pounds, of freight carried.....	4,852,505
Total amount of freight, one mile.....	896,863,718
Average rate of speed adopted, including stops (miles per hour).....	30
Rate of speed when in motion.....	36
Rate of speed when express trains.....	26.30
Speed of same when in motion.....	30.40
Rate of speed, freight trains.....	10
Same when in motion.....	12
Average weight, in tons, of passenger trains, exclusive of baggage.....	150
Average in tons, of freight, exclusive of freight.....	30

AMOUNT OF FREIGHT CARRIED.	
Products of the forest.....	193,020
Animals.....	871,945
Vegetable food.....	468,976
Other agricultural products.....	111,156
Manufactures.....	348,433
Merchandise.....	44,353
Other articles.....	3,012,738

Total tons..... 4,852,505

RATE OF FARE FOR PASSENGERS.	
First class through passengers.....	\$2.05
First class way passengers.....	2.75
Emigrant through passengers.....	1.25
Emigrant way passengers.....	1.47

THE EXPENSES OF MAINTAINING THE ROAD.

Repair of road bed and railway, excepting cost of iron.....	\$1,972,947.09
Cost of iron used in repairs.....	1,141,489.00
Repairs of buildings.....	247,140.91
Repairs of fences and gates.....	44,859.93
Taxes on real estate.....	283,732.73

Total..... \$3,689,098.64

Of the above total \$996,217.27 were allotted to passenger transportation and \$2,693,476.37 to freight transportation.

EXPENSES OF REPAIRS OF MACHINERY.

Engines and tenders.....	\$1,312,796.38
Passenger and baggage cars.....	240,315.54
Freight cars.....	779,105.18
Tools and machinery in shops.....	110,163.82
Incidental expenses.....	6,401.94

Total..... \$2,501,691.06

Of the above, \$700,034.87 were allotted to passenger transportation, and \$1,901,656.19 to freight transportation.

EXPENSES OF OPERATING THE ROAD.

Office expenses, &c.....	\$245,933.34
Agents and clerks.....	1,056,701.21
Labor—loading and unloading freight.....	581,575.01
Watchmen and switch tenders.....	297,373.19
Wood and water station attendance.....	39,914.45
Conductors, baggage and brakemen.....	966,049.39
Engineers and firemen.....	945,653.99
Fuel, cost and labor of preparing for use.....	992,896.01
Oil and waste for engines and tenders.....	146,737.19
Oil and waste for freight cars.....	27,961.73
Oil and waste for passenger cars.....	3,322.35
Loss and damage of goods.....	163,157.77
Damage for injury of persons.....	36,973.08
Damage to property.....	9,353.78
General superintendence.....	167,390.26
Contingencies.....	187,794.49

Total..... \$5,781,028.20

Of the above \$1,609,286.89 were allotted to passenger transportation and \$4,172,339.31 to freight.

STATEMENT OF THE EARNINGS FOR THE YEAR.

From passenger trains.....	\$3,968,590.83
From freight trains.....	11,933,547.04
From other sources.....	227,014.78

Total..... \$16,179,461.66

The above is without reference to the amount actually collected.

RECEIPTS FOR THE YEAR.

From passengers.....	\$3,196,877.34
From freight.....	13,393,027.25
From other sources:—	
Storage.....	6,778.95
Telegraph.....	35,961.06
Rents.....	75,553.86
Mail.....	167,808.15
Pavonia ferry.....	85,535.45
Hire of cars.....	5,749.51
Operating sundry railroads.....	306,723.09

Total..... \$16,179,461.66

PAYMENTS FOR THE YEAR OTHER THAN FOR CONSTRUCTION.

Transportation expenses.....	\$12,073,010.89
Hudson River ferry.....	285,329.44
Operating telegraph.....	110,099.19
Interest on funded debt.....	1,046,823.00
Rents.....	1,069,551.79
Internal revenue tax.....	83,417.28
Interest.....	264,043.55
Operating Twenty-third street ferry.....	32,933.45
Operating sundry branches.....	250,960.21
Hire of cars.....	5,578.25
Sundries.....	260,537.41
Operating Atlantic & Great Western Railway.....	356,470.59

Total expenses..... \$16,471,483.09

COST OF ROAD AND EQUIPMENT.

For graduation and masonry.....	\$2,427,316.06
Telegraph.....	12,666.32
Superstructure, including iron.....	3,405,045.54
Passenger and freight stations, buildings and fixtures.....	1,343,799.25
Engine and car houses, machine shops, machinery, and fixtures.....	1,237,613.83
Land, land damages and fences.....	513,104.08
Locomotives and fixtures, and snow-plows.....	3,518,095.98
Passenger and baggage cars.....	914,233.40
Freight and other cars.....	4,008,468.64
Pavonia and Twenty-third street ferries.....	532,548.16
Engineering and agencies.....	55,445,906.59

Total..... \$73,945,567.03

STOCKS AND DEBTS OF COMPANY.

Stock subscribed.....	\$38,536,910
Paid in, as by last report.....	78,536,910
Paid in, of capital stock.....	23,536,910
Funded debt.....	22,898,800
Total amount.....	23,898,800
Funded and floating debt.....	23,898,800
Rate, per annum, of interest on debt.....	7 per cent.

SPRINGFIELD CORRESPONDENCE.

Some Reasons for Passing the Fuller Bill.

SPRINGFIELD, Ill., January 31, 1871.

Before the close of the debate in the Senate on the Fuller bill, Senator Richardson, of Adams County, introduced a substitute. By this, every railroad corporation in the State was to make a report each year as early as the 1st of February, giving the length of line operated and gross receipts for the previous year. This report was to be made by the 1st of June this year for 1870. Roads earning \$3,000 or more per mile were to form the first class, \$6,500 the second class, \$5,000 the third class, less than \$5,000 the fourth class.

Railroads of the first-class were to be limited to 3 1/2 cents per mile for the transportation of an adult passenger a distance of 20 miles or less, 3 1/4 cents per mile for more than twenty and not more than 100 miles, and 3 cents per mile for greater distances. Those of the second class could charge 4 cents per mile for 20 miles or less, 3 3/4 cents for 50 miles or less, 3 1/2 cents for 100 miles or less, and for greater distances 3 cents per mile. Those of the third class would be permitted to charge 4 1/2 cents per mile for 20 miles or less, 4 1/4 cents for 50 miles or less, 4 cents for 100 miles or less, 3 3/4 cents for 300 miles or less, and 3 1/2 cents per mile for greater distances. Those of the fourth class for the same distances were limited to 4 1/4, 4 1/2, 4 1/4 and 4 cents, respectively. Where second-class cars were run, second-class tickets were to be sold at not more than two-thirds of the above rates. After some debate on Friday of last week, the amendment was voted down. Mr. Fuller called the previous question, and his bill was passed to a third reading very nearly in the shape in which it was introduced, the chief amendment since the publication of last week being one by Mr. Bangs, providing that no smaller charge than ten cents can be made.

This vote, which is equivalent to the passage of the bill by the Senate, by no means indicates unanimity of opinion on the part of those who recorded their votes for the bill. The large majority was obtained by a most singular combination. There are by no means a majority of the Senate who deem the bill worth anything. Many voted for it on account of the effect the bill will have on the people—demagoguish. Almost every man supposed to be in the interest of the railroad companies voted for it because they deem it wholly incapable of being enforced. Some who advocate the bill do so because it will simply bring the matter into the courts, if a certain other bill (to provide public prosecutors), spoken of by Mr. Fuller, should be passed.

Some of the advocates of the bill, among them Mr. Snapp prominently, take this line of argument: "When ever this rate, 3 cents per mile, is unreasonably small, the law will be inoperative. For some roads it is amply sufficient, and against these it will be perfectly valid. Those roads whose earnings will not warrant so low a rate, will, when prosecuted, prove that the rate is too low, and the law will have no effect as to them." Mr. Snapp, Judge Bangs and others maintained that the law, really, is of no use, *per se*; that the common law to-day covers the whole ground, and that railroads can be restrained from exorbitant charges now as well under it as under Mr. Fuller's bill; and that they vote for this simply as a starting point. I find confidence in the validity of the bill at a very low ebb among the Senators. You may have noted one very peculiar feature in the debates on this question: no friend of the bill has addressed any argument in its favor! Fuller's entire strength has been devoted against amendments.

Several Senators have also privately expressed themselves, and good lawyers too, that an appeal to the United States courts would prove the clause of the new constitution, under which the law is pushed through, invalid. Of the prospects for the bill in the House, I have no hints, although it is probable that it will go through in the same way, and on the same hollow vote. K.

—The receipts of the Suez Canal during December last amounted to £22,000, composed as follows: Transit of 69 vessels, about 760,000fr.; ditto small craft, 20,000fr.; ditto merchandise, 20,000fr.; total, 800,000fr.; being £12,000 in excess of the receipts of preceding month, and the heaviest return for the year. The work of deepening the canal has been going on without interruption, and it is further stated that notwithstanding the large dimensions of most of the ships not the slightest accident has occurred and not a single case of grounding.



PUBLISHED EVERY SATURDAY.

CONTENTS.

Page.	Page.
ILLUSTRATIONS.	SELECTIONS.
Miller's Platform Coup- ing.....433	Watering Stock.....438
Fairlie Locomotive.....445	History of Railroad Cars.....438
	National Control of Rail- roads.....444
CONTRIBUTIONS.	GENERAL RAILROAD NEWS.
The Miller Platform.....433	Railroad Earnings for De- cember and the year 1870.....438
The Narrow Gauge Manila.....434	Old and New Roads.....439
The Patent Office.....434	Mechanics and Engineer- ing.....440
"Protection for Civil En- gineers".....434	Traffic and Earnings.....440
Springfield Corresponden- ce.....441	Elections and Appoint- ments.....441
SELECTIONS.	Locomotive Statistics.....441
General Law for the Incor- poration of Railroad Companies.....434	Some Reasons for Passing the Fuller Bill.....441
The Vermont Consolida- tion.....435	The Erie Railway.....441
Eminent Domain as Appli- cable to Railroads and their Franchises.....436	EDITORIALS.
Boiler Explosions.....436	Breaking of Railroad Axles.....442
History of the Iron Rails upon the Southern Michi- gan & Northern Indiana Railroad.....443	Inventors and Patent So- licitors.....442
The Safety of Railroad traveling.....438	Announcement.....443
	Eminent Domain.....443
	"Circular Number Three".....443
	CHICAGO RAILROAD NEWS. 443
	PUBLISHER'S ANNOUNCEMENTS. 445

INDEX TO RAILROAD ADVERTISEMENTS.

Page.	Page.
Leavenworth, Lawrence & Galveston.....451	Illinois Central.....453
Chicago, R. I. & Pacific.....451	Chicago & Northwestern.....453
Kansas Pacific.....451	Milwaukee & St. Paul.....453
Western Union.....451	Pan-Handle.....454
Chicago, Alton & St. Louis.....452	Pennsylvania & Ft. Wayne.....454
Hannibal & St. Joseph.....452	Erie Railway.....454
Chl. Burlington & Quincy.....452	Kansas City, St. Joseph & Council Bluffs.....454
North Missouri.....452	Michigan Southern.....455
Pacific of Missouri.....452	Michigan Central.....455

Editorial Announcements.

Correspondence.—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Engineering and Mechanics.—Mr. M. N. Forney, Mechanical Engineer, whose office is at Room 7, No. 72 Broadway, New York, has been engaged as Associate Editor of this journal in charge of these departments. He is also authorized to act as our agent.

Our Prospectus and Business Notices will be found on the last page.

BREAKING OF RAILROAD CAR AXLES.

The tendency of the human mind to follow in the beaten track of other minds is illustrated every day. Certain questions come up for discussion at certain times, when, apparently, there is no other reason for it than the fact that some one else before has done the same thing. Discussions on the breakage of axles are now in season, and almost every railroad and engineering paper we take up has an article on that subject, which usually is more or less dogmatic in proportion to the smaller or greater degree of ignorance of the writer.

We suppose it might be assumed absolutely that the reason why axles break is because they are not strong enough; and this want of strength can be attributed to one of the following causes: 1st, to the original inferior quality of the material; 2d, to the deterioration of it from use; 3d, to insufficient quality, or, 4th, to the bad distribution of it in the form of the axle.

There is, perhaps, no other way of guarding against the first source of danger than for railroad companies to adopt some sufficient test, and have all the axles they buy subjected to it. Let manufacturers know that their axles will not be accepted unless they stand the inspection, and that it will be honestly made. Of course there is danger that improper "motives" might be used to influence the inspector who applied the test. The State Prison would be the only suitable place of residence for any person who should be induced by a bribe to accept axles of an inferior quality, on which the lives of innocent people, who are not in the "commission" business, are dependent. We cannot, however, have anything done without relying on the integrity of some honest person, and of such, fortunately, there are still plenty to be found.

Of the second source of danger, it is difficult to know exactly the truth regarding it. There is a current prejudice—we doubt if it is more—that an axle, from use,

becomes crystallized, and consequently weakened. That iron, when often subjected to strains greater than the limit of its elasticity, becomes weakened thereby, numerous experiments, carefully conducted by scientific men, have demonstrated; but that the jar to which an axle is subjected, if the latter is large enough so as not to be strained beyond its elastic limit, causes a deterioration in the strength of its material, there may, we think, be considerable doubt. There are many people, we know, who will talk learnedly about the effect of crystallization on iron, but there is much room for skepticism in relation to it. In a conversation with the late Mr. Roebling, while he was engaged in the construction of the Cincinnati Suspension Bridge, he stated that no crystals were ever perceptible in wrought iron examined under a microscope. Probably no one in this country has ever studied the subject more closely than he. Fairbairn, in his book on iron manufacture, says "the crystallization of perfectly fibrous and ductile iron has long been a subject of dispute," and also, that "native iron is disposed to break in octohedra and tetrahedra, or combinations of these forms;" whereas, in Tomlinson's Cyclopaedia of Useful Arts, it is stated that "the crystalline form of pure iron is probably the cube." It is to be doubted, therefore, whether the form, even, of the crystals of which we hear so much, is known. That iron, when suddenly fractured, often has a bright, granular appearance, which is mistaken for crystals, we well know; but if the fracture is caused by the particles changing from a fibrous to a crystalline condition, certainly there could not be much difficulty in ascertaining the geometrical form into which they arrange themselves, under the conditions which cause such a change. The main question, however, is not whether axles become crystallized by use, but whether they suffer any change which causes a diminution of strength. The scientific inquiry as to the nature of this change would of course be a very interesting, and probably would be a useful one; but the practical consideration for car-builders is, to know whether axles, after they have run, say a hundred thousand miles, are as strong as they were when they had run only ten.

Although it might be impossible to prove the crystalline theory, we know that most master mechanics are of the opinion that axles do deteriorate by use. If a rigorous inspection and test of the axles were made before they were put into use, the truth of this opinion might be determined by subsequent tests after the axles had been running a longer or shorter time, or had made more or less mileage. If, for example, out of a lot of two thousand new axles, ten were taken at random, and thoroughly tested, either by a falling weight or other means, and a record of the test carefully preserved, then, if after the cars had run, say 100,000 miles, ten more were taken out and tested in the same way, and successive tests were made for each 100,000 miles the cars ran these successive tests, it would furnish information of the actual deterioration, and also data from which its rate could be estimated. In making such an experiment, it would be important to give the size of the axle and the weight of cars, because a light axle, which would be subjected to very great strain relatively, might suffer much more from use than a heavier one. In Fairbairn's book, already quoted from, he says: "A French writer of eminence, Arago, appears to consider the crystallization of wrought-iron to be due to the joint action of time and vibration; but we think, with Mr. Hood, that time and its duration depend entirely upon the intensity of the disturbing forces, and, moreover, that the time of fracture is retarded or accelerated in a given ratio to the intensity with which these forces are applied."

Any experiment, therefore, to be satisfactory, should be made with axles of the same size, some of which have been run under heavy and some under light cars. The deterioration attributable to the weight of the car, and also to its mileage, could thus be compared. Such an experiment would also throw some light on the quantity of material, or in other words, the weight the axle should have, for a given weight of car. That a heavy car should have stronger axles than a light one is of course plain, but the quantity of material which should be put into them to insure safety is not yet clearly established. It may be, and probably is, more economical to put a certain quantity of iron into axles rather than to put less, independent of the question of safety; because if they are subjected to a very great strain per square inch of section, they may be permanently injured thereby; whereas if they are larger, and the strain relatively less, the quality of the iron may not be affected at all by any number of such strains.

Some experiment is also needed to elucidate information in regard to the proper distribution of material, or in other words, the proportions of axles. If, as master mechanics say, a much larger number of car axles

break off close to the inside of the hub of the wheels, it proves conclusively that they are too weak at that point and should be made larger there. A careful record of all the breakages and the size of the axles which have broken on any road would be a valuable contribution to the RAILROAD GAZETTE and its readers. We are now collecting drawings of the axles used in freight and passenger cars and on engine and tender trucks on the different roads. It is our purpose to publish engravings of them, or as many of them as we can collect, on a full or double-page lithographic sheet, so that master mechanics and car builders can compare them; and possibly the way may thus be opened by which a system of uniformity may be evolved. The officers or draftsmen of railroads are requested to send us tracings of the axles they use and also records of any experiments they have tried.

Inventors and Patent Solicitors.

A valued contributor, in an article which we publish in another column under the head of "The Patent Office," makes some complaints concerning the way in which the American Patent Office is managed, and at the same time indulges in some bitter reflections on patent solicitors as a class. Now we shall not defend the Patent Office; doubtless it is managed no better than it should be. But we believe, and we have good reason to believe, that it has been one of the best managed departments of the Government, and that under the late Commissioner its sub-officers were selected with a care rarely if ever before exercised in any administrative department of the General Government, and that they were distinguished for efficiency. We believe that it is the unanimous opinion of those who are best informed that Commissioner Fisher was one of the ablest of the officers that have occupied the position.

Again we do not endorse any indiscriminate abuse of patent solicitors, although it is very true that many of them practice their calling in the most dishonorable manner. But the business is just as legitimate as any other. A patent solicitor may be quite as useful as an inventor. He does a work which must be done and which one who devotes himself to it can do better and cheaper than an ordinary inventor. Any man may apply directly for a patent, if he has the knowledge necessary to make an application, but if he has not or his legitimate occupation requires his time, he must make his application through an agent.

It is true that the laws should be made as simple as possible, so that no unnecessary difficulties may be encountered in preparing and presenting an application, but it is also true that it is the business of the applicant and not of the Patent Office to see that the application is properly made, just as much as it is the business of the suitor and not of the court to see that his case is properly prepared and prosecuted.

The fault of many patent lawyers is, that they advise every man who has some old or new thing which he believes he has originated to apply for a patent, even when they know that the invention is not patentable, or not valuable if patentable. It is our opinion that the solicitation of a patent is by no means the difficult thing many believe it to be, and that in many cases an intelligent man by the aid of some simple forms and instructions could prepare his own application just as well as an agent; but if not, he must have recourse to an agent who understands the business, just as we all go to the butcher, the baker and the candlestick-maker to do what we cannot well do ourselves.

And again we do not see why it is particularly appropriate that the Commissioner of Patents should be an inventor. What is needed in that office is, first, a knowledge of patent law, second, of the history of inventions, and, third, of mechanics, engineering, and all the practical arts. Of the latter it is utterly impossible that any one man should know enough, and in order to obtain the various special talents required, the examiners should be chosen with special reference thereto. The very first thing to ascertain regarding an invention is its patentability, and there is no reason why an inventor should have the knowledge requisite to decide this more than any other man. A patent lawyer ought to have just this knowledge. An engineer, a manufacturer, a chemist, or a machinist would have some of the qualifications which the Commissioner should have; but he should have also a thorough knowledge of the law of patents and the practice of the office and good administrative ability. It is unfortunate, we believe, that so little weight has been attached to technical knowledge in selecting persons for the position, but this alone, it seems to us, would only half qualify a man for the place; and as in our Government the practice has become all but universal to select men for administrative offices on account of their po-

tical services to a party, and not at all or very little on account of their qualifications for the position, it is a little remarkable that the Patent Office has been no worse managed than it is.

Eminent Domain.

Mr. Elliott Anthony, a lawyer of this city and a member of the convention which framed the new constitution of this State, has contributed to the *Chicago Tribune* an article fortified by a liberal citation and quotation of authorities, in which he purports to set forth how far the right of eminent domain is applicable to railroad companies and their franchises. For Mr. Anthony's conclusions we refer the reader to his article, which we reproduce elsewhere. As for his conclusions, they seem to be, that the State in granting franchises to a corporation gives nothing which it may not at any time recall on its own terms and at its own convenience. More than this, it may not only recall what it gave, that is, in the case of a railroad corporation, the privilege of constructing and operating a railroad, but also exercise rights of ownership over the material property constructed in accordance with these franchises, without any regard to the terms of the franchise itself.

Thus, the State of Illinois agreed with capitalists of London, Boston, or New York, that if they would construct and operate a railroad within its limits, it would give it authority to make charges for transportation at such rates as it might fix. In accordance with this agreement, the company constructed the railroad, thereby increasing the value of other property in the State to the amount of millions of dollars. But as soon as it is completed, the State by this right of "eminent domain," as Mr. Anthony would interpret it, takes from the company the right which it had expressly granted it, and assumes the right to fix charges to suit itself, that is to suit the patrons of the railroad, who, collectively, form the State. If the State has this power, so much the worse for the State, say we. To be sure it may boast that it has secured the construction of some five thousand miles of railroad by false pretences, but it will hardly attract any future investments of capital, whether accumulated within the State or coming from abroad, in any corporate enterprise after it has made it understood that it practices this peculiar right of eminent domain. Who would deposit with a banker, even if he promised (and sometimes paid) fifteen per cent. on deposits, if he professed the right at any time to reduce or refuse the interest and steal the principal? Yet this is a rule which, we are told, is to prevail in Illinois, under which the people are defended from monopolies.

But we cannot see that Mr. Anthony's reasoning justifies his conclusions. It still seems clear to us that private property cannot be taken for public uses without just compensation. By the right of eminent domain, the State may take possession of railroad property, as of any other property, on rendering just compensation therefor; and, we believe, it is conceded that the Legislature has the authority to decide when the public necessity requires such appropriation of private property. But how the new constitution, or any other constitution subordinate to the fundamental law of the United States, can give any person, corporation, or government, any authority affecting property rights which accrued before such new constitution was framed, we do not see. In case of the abrogation of the Federal Constitution we might organize our government *de novo* and establish all rights of property on a new basis. When that happy day arrives, then, if they see fit, the people may make an equal division of property, or unite all property, including railroads, in the possession of a single corporation, of which every member of the community shall be a member. When this social dream is realized, the laziest street loafer will have an equal interest and an equal voice in the management of the railroads with Vanderbilt himself. Then, indeed, will be the Golden Age of the indolent and the wasteful, too quickly to be ended by the consumption of accumulated capital or the rebellion of those who are willing to work and to save, but not to support in idleness the rest of mankind.

Announcement.

Next week we intend to commence the publication of a series of papers on the warming and ventilation of railroad cars, prepared carefully after collecting material for several months. In it we will give descriptions and illustrations of several of the most approved systems. In order to make these articles as complete as possible, we invite those who have tried systems and proved them successful to send descriptions and drawings to our engineering editor, Mr. M. N. Forney, at Room 7, No. 73 Broadway, New York.

"Circular No. 3."

Mr. Rufus Hatch continues his attacks on the Chicago & Northwestern Railway Company, or rather on its stock—for we imagine his object will have been attained if he succeeds for the time in depressing or keeping down the market price of the stock—in a pamphlet entitled "Circular No. 3" which, to say the least, is entertaining reading. It professes to give some secrets of railroad construction and especially of railroad purchasing in the Northwest, which, if true, are interesting expositions of the "ways" that are dark and the tricks that are vain which great railroad managers, in common with the "Heathen Chinese"—and, we may add, the Wall street (or Broad street) broker, occasionally exercise. It by no means follows, however, that the Chicago & Northwestern is a poor property, even if it has once or twice made a bad bargain. The value of the stock depends upon the earnings of the road, present and prospective; and we believe that the lines which the company has obtained in Iowa, Minnesota and Michigan are among the most fortunate acquisitions of the company—well placed, having little competition and with a good business now which is sure to increase rapidly for many years to come. It would, of course, have been better for the company if it had paid less for them, just as it would have been better still if it had got them for nothing.

We are unable this week to publish any part of the circular, which, however, will reach many of our readers in the Northwest through the daily papers.

Chicago Railroad News.

Sunday Trains to Council Bluffs.

From the notice which we published lately (copied from a telegram), it would appear that the Sunday train carrying the United States mail between Chicago and Omaha, would run only on the Burlington line. The arrangement is, that it shall run on each line in turn. The train leaves on the time of the regular morning train. Tickets by either road will be good on this Sunday train, and the passenger will only have to learn by which road the train goes the Sunday he leaves Chicago, in order that he may go to the right depot.

Chicago, Burlington & Quincy.

Business over the Fox River Valley line has steadily increased during the past two weeks, equaling in every respect the anticipation of the managers. An additional freight train was put on the line last week, and during the week just closed extra freight trains have been run every day.

On the main line the traffic both in freight and passengers is improving.

Michigan Central.

Both the Detroit and Jackson, Mich., papers have been of late discussing a proposed removal of the company's shops from Detroit to Jackson; from which it might be gathered that a greater change is contemplated than will probably occur—very soon, at least.

Real estate owners in Jackson have given eighty acres of land and the company is acquiring additional property with a view of locating there such repair shops as are required for their branch lines diverging at Jackson. The shops at Detroit are at present inadequate to the needs of the company, owing to lack of room, and, while the force there will not be at once diminished, much of the work for the main line will be done at Jackson. While an ultimate removal of most of the work to Jackson is now, and has been for some time, under consideration, no immediate change is to be made.

It is expected that the road bed of the new Air Line, from Niles to Jackson, will be settled sufficiently by about the 1st of May to warrant the running of through trains by that route.

Hindustan.

Mr. A. M. Smith, of this city, has received from Mr. Henry Condon, General Traffic Manager of the Great Indian Peninsula Railway, a very excellent railroad map of Hindostan. Few who have not traced the progress of railroad construction in that part of the world have any idea of the extent of railroad operation there. Part of the route "around the world," which has been of late generally made known, consists of a line of road 1,464 miles across Hindostan; 616 miles from Bombay to Jubbulpore, by the Great Indian Peninsula Railway, and the remaining 848 miles to Calcutta, at the mouths of the Ganges, by the East Indian line. About 6,000 miles of road are now in operation in India, the Great Indian Peninsula Company alone controlling 1,286 miles.

Chicago & Northwestern.

A bill is pending in the Wisconsin Legislature authorizing the consolidation of the Baraboo Air Line with this company.

—A bill is before the State Senate of Missouri making it unlawful to elect or appoint to any office of profit or trust in any railroad corporation any person who is a stockholder or owner in part of a transportation company.

—The annual election of the Little Miami Railroad Company on the 31st ult. resulted in only one change in the board, namely: H. E. Spencer, of Cincinnati, to fill a directorship *vice* John Bacon, of Springfield.

History of the Iron Rails upon the Southern Michigan & Northern Indiana Railroad.*

About 330 miles of this line were laid down in the year 1851, and operated immediately thereafter with a considerable traffic; but, the company being then engaged in the construction of branch lines, no accurate account of expenses or renewals was kept until the branches were finished, in 1857, when the length of track owned by the company, including sidings, was 567 miles.

I have included sidings in the length of track and in all calculations of the averages of wear, because, taking into account the extensive service at the termini and principal stations, the sidings will require as much iron for renewals as an equal length of main line.

The gradients and curves upon this road are light, the maximum gradient 28 ft. per mile, and the sharpest curves of about 1,900 ft. radius, excepting a few short planes and curves upon the branch lines, which are more severe.

The iron rails first laid upon the road were nearly all of British manufacture, of 56 and 57 lbs. per yard, "Erie pattern," with a pear-shaped head, 3½ in. high and 4 in. base; about 50 miles, of similar section, from Brady's Bend, Pa., which proved dangerously brittle, having been the only American rails now known to have been laid in the first track. The British rails were made from piles apparently composed from only one kind of iron, presenting an even, granular fracture throughout the section, and were much better welded than any made in England or in America which we have since procured to replace them. They were 15, 18 and 21 feet long—chiefly 18 feet; partly laid with cast-iron and partly with wrought-iron chairs; the joints opposite, and resting upon a single tie. The sleepers were mostly of white oak, laid 2½ feet apart centers; 8 feet long, 6 inches thick, and from 6 to 9 inches wide. The ballast was of sand, or very fine gravel; but the road-bed was not thoroughly ballasted—in parts, not at all.

As would be expected from these conditions, the rails were rapidly bruised at the ends, so that as early as 1856 those laid previous to 1852 were in desperate need of repairs, and a force of smiths was in that year set at work mending them, by which means a large proportion of the rails, which had to be removed because of their bruised ends, were restored to the track. The condition of the main line was also helped by taking the sound railings from the sidings and branches, and replacing them with battered or mended rails, so that the necessity for the purchase of new rails for repairs was postponed.

Since 1859, the surface of the track has been maintained in excellent condition, and the road has been in as good order, in respect to depth of ballast, drainage, and prompt renewal of sleepers as any of the best lines in the United States; so that rails have had a fair chance to show good results in wear, if the nature of the metal from which they were made and the mode of its manufacture would permit. It would have been better for the track and the rolling stock if repairs had begun sooner, and if they had been more liberal in amount at first, for the tables given here, which show what was done by way of repairs, do not fully indicate what ought to have been done, but only what it was possible to get along with.

A considerable and judicious economy was effected by the mending of rails, instead of re-rolling them, since the cost of re-rolling has averaged, during the period included in this account, about \$3,500 per mile, while the cost of repairing rails by hand has averaged about \$600 per mile; the mended rail not being so good, of course, as the re-rolled rail, but serving the purpose of keeping the track in a condition of comparative smoothness.

On a part of the main line, 18 miles in length, which had already been relaid with mended iron, where the grades were very light, and few curves, it was found that the mended rails averaged a wear of twenty months before being taken up to be again repaired; on branches, they wore longer.

The metal laid down in renewing the track, except about 30 miles of British iron, has been chiefly re-rolled rails of 61 lbs. weight per yard, with a pear-shaped head; 4 inches high and 4 inches wide on the base. About 5 miles were laid with flared joints, for which the section is of improper shape, and which, of course, did not do well; the remainder was laid with a modification of the "Howe joint." This joint has proved the best of any, upon a light, sandy ballast, the only material which was available upon this line, and one which requires that the joint should have the broadest and steadiest bearing upon it which can be devised. Reports of the condition of all the rails removed from the track, show that where the plate chair upon a single tie is in use, .64 of the whole number are bruised at the ends only; whereas, upon the portions of the line where the Howe joint is laid .39 of the whole are so bruised. Since 1858 the centers of the sleepers have been laid 2 ft. apart; since 1864 the sleepers have been 9 ft. long.

It will be observed in the tables that the rails of 1866 and 1865 proved exceptionally bad. Previous to 1864, the rails had been re-rolled in "two high" rolls, from solid piles of from 6½ to 7½ in. square (sometimes composed entirely of re-worked rails, sometimes with a head-flat of harder metal), into rails 21 ft. long. At this period, the enormous cost of iron, owing to the rebellion and to the tariff, caused railway managers to seek for the cheapest quality which could be obtained; and although re-rolled rails were then evidently inferior to the rails first laid down, and were wearing out with alarming rapidity, resort was had to "three high rolls," and to piles from 9 to 10 in. square, in which were from 3 to 6 pieces of old rails which had not been broken down into flats; and these piles were

* From a paper read before the American Society of Civil Engineers, by Chas. Faine, C. E.; with remarks on the construction and wear of rails, by J. Dutton Steele, C. E.

rolled out into rails 27 ft. long. This mode of manufacture continued until near the close of 1867; by returning them to solid piles—in some reducing them in size, and by the use of raw puddle-bar between the harder head-flat and the re-worked old rails, better welding has been secured, and the resulting wear has been much prolonged; yet these rails are not equal in quality to those made from 1860 to 1863. The length adopted for rails after 1865 was 24 ft. Since this time, it has been found that the larger the proportion of new metal introduced into the piles, the better have been the rails—a result probably due to the fact that a great part of the rails which were being re-rolled, having been re-worked once or twice before, had become quite unfit for making rails again. Although this experience of 1864-5 was convincing that the solid pile is better than one composed in part of old rails, not broken down, yet, as many rail makers and some engineers still maintained a contrary opinion, an experiment was afterwards made to settle the question. A lot, some hundreds of tons, of rails was made from piles in which there were three unworked pieces of old rails; and another lot was made from the same iron and according to the same specifications, at the same mill with the first lot, with only the difference that all the old rails used were first broken down into flats. These two lots of rails were laid down in situations where they would undergo similar wear, and at the end of one year the two classes were compared; of those made with old rails in the pile, 1-12 had been removed from the track, and many others were showing signs of disintegration; of the rails made from the solid piles, 1-52 of the whole had been removed, and the remainder were apparently in good condition.

TABLE NO. 1.

NEW AND REPAIRED RAILS LAID DOWN UPON THE WHOLE ROAD.

Year	Miles of road operated	Miles of new rails laid down		Miles of rails repaired		Miles of new and repaired rails laid down		Average number of trains over each mile in the year.
		In Year	Total	In Year	Total	In Year	Total	
1852	890	.....	.....	.....	.....	.....	.....	3,500
1853	884	.....	.....	.....	.....	.....	.....	4,180
1854	840	.....	.....	.....	.....	.....	.....	4,680
1855	840	.....	.....	.....	.....	.....	.....	4,950
1856	848	.....	.....	.....	.....	.....	.....	4,670
1857	827	.....	.....	.....	.....	.....	.....	3,380
1858	874	.....	.....	.....	.....	.....	.....	2,710
1859	874	6.96	.....	84	265	91	272	2,650
1860	874	8.69	15.58	79	314	88	360	2,780
1861	874	10.18	25.76	80	424	90	450	3,100
1862	874	20.87	46.63	95	519	116	566	3,600
1863	874	28.56	75.19	86	605	110	676	3,790
1864	870	39.05	119.24	97	702	126	812	3,540
1865	870	46.18	155.43	94	796	140	922	3,580
1866	878	61.08	246.45	81	877	179	1,134	4,180
1867	883	66.30	312.75	129	999	188	1,312	4,110
1868	887	87.33	400.08	78	1,137	225	1,537	4,570
1869	896	94.85	494.93	13	1,210	168	1,705	5,000

NOTE.—The length of main track maintained after 1856 was 524 miles; the subtraction of this sum from the numbers in the column of miles operated will give the length of the sidings.

Jan. 1, 1870.—There remained on the branches 120 miles of the iron laid in 1867-7, all of which had been repaired.

The great increase in miles repaired in 1867-8 is due to the increased length of the rails repaired.

In 1864 the use of a branch four miles long was suspended.

TABLE NO. 2.

TRAFFIC BORNE BY THE NEW RAILS LAID DOWN UPON THE WHOLE ROAD.

Year	Miles of rails laid down	Miles of same rails remaining in track Jan. 1, 1870.	Per cent. remaining.	Per cent. worn out.	Average number of trains over each mile in the year.	Average number of trains which have passed over the rails remaining Jan. 1, 1870.
1859	6.96	1.22	17.5	82.5	3,300	60,000
1860	8.69	3.52	40.8	59.2	3,480	46,500
1861	10.18	4.65	45.6	54.4	3,880	43,000
1862	20.87	6.25	29.9	70.1	4,500	38,500
1863	28.56	9.34	32.6	67.4	4,740	34,000
1864	39.05	10.86	27.8	72.2	4,900	29,500
1865	46.18	23.12	50.0	50.0	4,900	24,500
1866	61.08	26.30	43.0	57.0	5,160	19,500
1867	66.30	59.70	90.0	10.0	5,140	14,500
1868	87.33	86.63	99.3	0.8	5,710	8,900
1869	94.85	All	.....	.....	6,100	.....

This table is calculated upon the assumption that upon one-third of the whole length of the line, where very little new iron has been laid, only one-half of the average traffic is experienced. This assumption is very nearly correct, and rejecting the service upon this one-third of the line from the calculation of averages, the above results are obtained.

TABLE NO. 3.

TRAFFIC BORNE BY THE NEW RAILS LAID DOWN UPON THE WESTERN DIVISION.

Year	Miles of rails laid down	Miles of same rails remaining in track Jan. 1, 1870.	Percent. remaining.	Percent. worn out.	Average number of trains over each mile in the year.	Average number of trains which have passed over the rails remaining Jan. 1, 1870.
1859	2.91	None	...	...	5,396	.....
1860	3.17	0.56	18	82	5,320	72,000
1861	8.01	3.13	39	61	6,170	66,000
1862	13.12	1.57	12	88	7,260	57,500
1863	14.78	4.51	31	70	8,030	62,500
1864	26.14	3.44	13	87	7,530	44,500
1865	15.68	0.62	4	96	7,470	37,000
1866	21.46	0.12	0	100	7,910	29,400
1867	28.74	23.19	80	20	7,910	31,500
1868	33.46	23.32	69	31	8,890	13,500
1869	35.79	28.70	100	1	9,000	.....

Upon this division, as upon the whole road, the traffic has been proportioned as follows:

Freight trains.....	0.5
Passenger trains.....	0.4
Working trains.....	0.1

The above tables have been compiled from the annual reports and from the records of the engineer's department. Excepting the first two or three years of the existence of the railway company, accurate accounts have

been kept of the miles run each year, by the engines, including switching engines. For those years, the miles run by engines have been calculated from the traffic returns; from this account of the total number of miles run by engines has been deduced the average number of trains over each mile of the track, dividing the total miles run by the total number of miles of road operated, including sidings. Upon the western division of the road, which is about 100 miles long, and the most severely worked of any part of the line, the miles run by engines have been recorded separately from the accounts of the other divisions; and as the traffic over this division is very uniform throughout its length, Table No. 3, which shows the experience of 10 years upon it, is a very correct exhibit of the performance of re-rolled rails.

In considering these tables it should be remembered, as indeed Table No. 1 clearly reveals, that the life of all the iron has been prolonged to its farthest limit by repairing; this was more practicable with the first rails laid down than it is with modern ones; because, although from the imperfection of the joint used, they became battered at the ends, they remained sound in the middle, being more thoroughly welded. The rails now made are laid upon an improved joint; if they fail anywhere it reveals bad manufacture, and the imperfect welding generally extends throughout the length of the rail, rendering it useless to repair it—so that only about one-half the number of rails formerly repaired in each year are now mended, although by improved machinery it can be done at less cost and better.

I am aware that this account of an experience with iron rails will not have the interest which it would have possessed before steel rails were so generally adopted for the renewals upon heavily worked lines; yet, even now, there are engineers who need to be reinforced in their struggles against mistaken views of economy, and to these I offer this contribution, as *memoires pour servir*.

The length of main track maintained after 1856 was 524 miles, the subtraction of this sum from the numbers in the column of "miles operated" will give the length of the sidings.

REMARKS BY J. DUTTON STEELE, CIVIL ENGINEER, MEMBER OF THE SOCIETY.

Referring to the paper which has just been read on the wear of rails, etc., there is no doubt but it is a correct exposition of the experience on the road referred to, and as such is of no value; but so various are the influences, both from the modes of manufacture and the local peculiarities to which rails are subjected, that statistics from other roads may be provided showing directly opposite results in several important particulars.

We have in this paper the principle strongly implied, if not directly expressed, that iron may become so highly refined by repeated workings, that it cannot be welded without the interposition of less pure layers—a popular theory among rail makers, but one which I apprehend is entirely in error. Indeed, I have heard this mode of making rails characterized as not welding their parts, but sticking them together with cinder. The best iron we have is made from scrap; we hear nothing of the difficulty of welding them, no matter how often they have been worked; the more work the better. The celebrated Damascus blades, the highest quality of carbonized iron of which we have any knowledge, is said to be made of wire; and the same principle is acknowledged in our country, where wire ropes are much used. When superior iron is needed it is made from worn-out wire ropes; though more care is required to weld pure than impure iron, particularly where it is worked in large masses. Those who were connected with the early railroad experience in this country have a pleasant recollection of the double refined Ebw Vale rails, which were among our first imports. Unfortunately for the rail interest, when worn out as rails they were too valuable for re-conversion, and found their way into car-axes and other similar uses. The manufacturers of these higher qualities of iron found no difficulty in welding them, though the railmakers would sandwich them with their own poor stuff, if they were allowed to do so.

In a somewhat extended experience upon one of the largest freight roads in this country, it was my practice, for many years, to have the old rails reconverted, without any admixture of new iron; the best rails, such as the Ebw Vale, were selected for the heads, and the inferior for the flanges; all were broken down into slabs and thoroughly welded; and, to secure as perfect a weld as possible, an English mode of effecting the same object was adopted, that of taking upon the rail piles two welding heats, by passing them several times through the rolls, after the first heat, and returning them to the furnace before they were finally drawn into rails. The result was better rails than were obtained by any other mode; better, even, than now.

I may here refer to what I apprehend to be a prevalent error as to the use of hard granular iron for the heads of rails. The Ebw Vale iron, which produced such satisfactory results, was not of that character; it was a well-worked fibrous iron, and I believe all the best results have been produced from iron of that character in the heads. Some fifteen years since, an experiment was made under my observation, bearing upon this point: Rails made of fibrous and granular iron were laid alternately upon a heavy freight-bearing road; at the end of six months the fibrous heads showed the most marks of wear; at the end of twelve months the granular heads began to break up, and the result was that the soft, fibrous rails wore out two of the hard granular.

In the early railroad experience, a patent was taken out in England for making the heads of rails of granular iron, and at least two patents have since been taken out in this country for the same object; but all with the same result—all have passed into oblivion, under the test of practice. There are several problems in the wear of rails which may be worthy of note. We

all remember what a run the double-headed rail had in England, and how signal has been its failure; the first head subjected to the action of the wheels became granulated, and its tensile strength destroyed, so that when the rails were inverted they broke.

True to the same principle, we find that any cause which changes the position of rails in the tracks, so as to alter the bearing of the wheels upon them, causes their destruction. If they are reversed side for side to the flanges, they wear out quickly, and even if they are taken up from one point in the road and laid down in another, by which means the bearing of the wheels upon them is, of necessity, more or less changed, and granulated surface is broken up, and their durability is decreased."

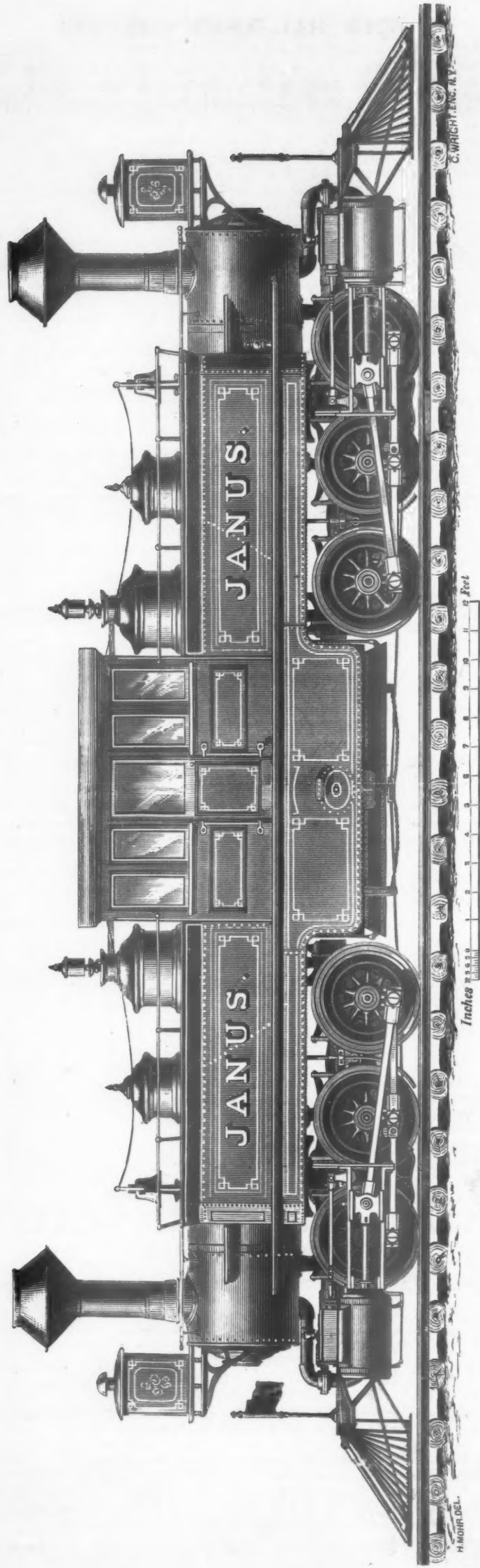
National Control of Railroads.

The New York *Bulletin* in the course of an article on this subject expresses the following opinions:

Without discussing the various pretenses on which this project is advocated, it may suffice to summarize the whole matter by stating it as an ostensible attempt to transfer the control of the railroads of the United States from the State Legislatures and the railway companies into the hands of the Federal politicians. The question is simply central control *versus* local control—political regulation *versus* private and proprietary. Thus stated, the proposal carries on its face its own refutation. Conceding all that is charged respecting the present management of railroads, what reason have we for expecting any improvement under Congressional legislation? It is said that the State Legislatures are so corrupt that the railroads find it easy to control them; conceding this, what would be the gain by the proposed transfer of authority? The corruption would then all center at Washington, instead of being distributed among over thirty local governments. We can easily conceive how this concentration of the profits of railroad lobbying should appear very desirable to members of Congress: for the control of some \$2,500,000,000 of railroad property would be to Congressmen a source of immense wealth; and this fact suffices to explain the interest shown at Washington in this scheme. If all be true that is charged against the roads respecting the corrupt influencing of legislation, the roads would simply do at Washington what they do at the several seats of State Government; the only difference being that the concentration of all this influence on Congress would make it even more subservient to the railroad interest than are the local legislatures. This pretended remedy, therefore, would be a most serious aggravation of the evil. Those who may be disposed to favor this scheme are perhaps not aware that, as a rule, it is impossible to get railroad privileges from either Congress or the legislatures without a "consideration," and that with such *douceurs* they can get almost anything they please to ask for. These payments to legislators constitute, in many cases, a serious tax upon the finances of the roads, for which the public have ultimately to reimburse the companies in one way or another. It is clear, therefore, that, in the first place, the roads, in the main, have matters their own way in spite of the regulation of the legislatures; and, next, that for this acquiescence in the policy of the roads, the public have indirectly to pay the legislatures; and, further, that the result would be substantially the same in the event of transferring railroad legislation from the States to Washington. It results, then, that the public do not gain, as they vainly imagine, advantage from legislative interference with the roads, but that, by conferring the power of regulation on the legislatures, they establish a fruitful source of corruption and encourage a system of blackmailing from which they are the chief sufferers.

The plain inference from all this is that the true remedy is not in centralizing and intensifying legislative interference with railroad interests, but in exempting the roads, as far as possible, from this so-called regulation as it now exists. The most wholesome regulators of the railroad interest are free private enterprise and open competition. If it be charged that the railroads are growing up into large aristocratic monopolies, the reply is that they can become such only so far as they are fostered by legislative privileges, and that the surest check upon such a tendency is the allowance of a wholly unfettered competition from the building of new roads. The larger the profits made on existing roads, the stronger the inducements to build new ones, which, by competition for freights, would keep down the charges for transportation. This natural regulation of rates is infinitely better than the arbitrary tariffs of legislatures, which are never regulated with an intelligent regard to the relations between the means of transportation and the freight to be carried. If, however, the people blindly insist upon legislation prescribing how the roads shall do their business, it is clearly infinitely better that such prescription shall come from local authority than from the federal; for what idea can a New England Congressman have of the requirements of railroads in California? The whole affair would result only in endless embarrassment to the railroads, and a consequent injury to every interest dependent upon transportation.

—The Sacramento *Union*, which rarely loses an opportunity to attack the Central Pacific Railroad Company, says that that company has transferred all the lands granted it by the General Government, amounting to about 10,000,000 acres in California, Nevada and Utah, to Charles Crocker and S. W. Sanderson, who are respectively the Vice President and the Attorney of the company, in trust for the security of \$10,000,000 of bonds. This step is taken, the *Union* intimates, as a "flank movement," to guard a probable act of Congress providing that these lands shall not be delivered but held in trust by the United States as security for the payment of the interest and principal of the second mortgage bonds of the company which the Government guarantees.



FAIRLIE LOCOMOTIVE,

BUILT BY
WILLIAM MASON, TAUNTON, MASS.

Weight with fuel and water.....60 to 70 tons.
Cylinder, 15 inches in diameter, and 22 inches stroke.
Diameter of Driving Wheels.....43 inches.

Diameter of Boiler.....44 inches
No. of 2 inch flues in each barrel.....139
Length of Fire Boxes.....54 inches.

THE FAIRLIE LOCOMOTIVE "JANUS."

So much discussion has for some time been current in the engineering papers in relation to the "Fairlie" system for locomotives, that our readers will be especially interested in the elaborate engraving which we give this week of the engine "Janus," built by William Mason, of Taunton, Mass. Independent of the merits of this machine, the engraving, merely as a work of art, would attract attention and excite interest. We doubt whether a better specimen of wood engravings, of an engineering subject, has ever been published in any illustrated paper. The credit for this is due to Mr. Chauncey Wright, of New York, who engraved it.

It is not our purpose to discuss the merits of the Fairlie system at the present time, any more than to present the claims which are made for it by the inventor, and describe the machine which we have illustrated. The discussion between Mr. Evans, of New York, and Mr. Fairlie, will be recalled by most of our readers, and perhaps its somewhat acrimonious character is remembered more distinctly than the arguments of either of the disputants. Be that as it may, there is no doubt that engineers, master mechanics, and railroad men generally in this country, have manifested a great deal of interest in this plan of locomotive.

We have before us a copy of the provisional specification filed by Mr. Fairlie in the "Great Seal Patent Office" in England, which is dated May 12th, 1864. Perhaps no better statement could be given of what is claimed for this system than a liberal quotation from this document. Mr. Fairlie says:

"My improvements have for their object, to obtain a large amount of tractive power, at the same time to avoid any excessive pressure on the individual wheels of the locomotive; also to provide for the locomotive adapting itself readily to the turning of sharp curves without the disadvantages usually attending the action of large locomotives under such circumstances. Moreover, according to my arrangements, it is unnecessary to turn the locomotive round, as it is similarly arranged at both ends, and equally well adapted for traveling in one direction or the other. The tractive power of locomotives, as is well understood, depends on the bite or hold of the driving-wheels on the rails; and in order to produce the bite or adhesion required, it has heretofore been usual to couple three, or even four, pairs of wheels in one locomotive engine; this, although distributing the weight of a heavy locomotive and obtaining great tractive power, to a certain extent incapacitates the engine from passing round sharp curves, and although not subjecting the rails to hard wear while running in the straight, does so in passing curves. It has also been usual to concentrate the weight of heavy locomotive engines on a few wheels, to facilitate turning curves, and at the same time retain great tractive power; but this, while it is limited in extent, is very detrimental to the rails throughout, and also detracts from the safe running of the wheels.

"Now, according to my invention, I mount the boiler in the center of two frames, each frame having four or more wheels, and one, two, or more cylinders, forming two distinct engines, which are complete in themselves, the steam being supplied from the same boiler to both engines. I thus mount the locomotive engine on a large number of wheels (eight), which are disposed in such manner as to permit of the engine running freely on the sharpest curves. These wheels are all driven by the engine power, and therefore if the locomotive be large and heavy, will possess great tractive power, and will work with the minimum of damage to the rails and permanent way. I construct my boiler of considerable length, with the fire-box in the middle of its length, the body of the boiler extending therefrom in either direction, and terminating at each end in a smoke-box or flue, between which and the fire-box the tubes communicate as usual; thus there are double sets of tubes running in opposite directions from the fire-box. * *

"I mount my locomotive on eight wheels, as before mentioned, (on what is termed with reference to railway cars the bogie principle), being in sets of four wheels, with suitable frame-work and independent engines disposed towards each end of the boiler which they carry. This frame-work is so adapted and fitted to the boiler that the trench or bogie with its engine or engines may swivel or incline itself to the direction of the length of the boiler, and so adapt itself for turning curves in manner exactly as when applied to railway cars. Each truck or carriage of four wheels is furnished with two driving cylinders which communicate with and drive one pair of the wheels somewhat as usual in driving four-wheeled locomotives, the other pair of wheels being driven therefrom by coupling rods. Thus in one locomotive I have four steam-driving cylinders

acting simultaneously in four pairs of driving-wheels. Instead of two cylinders, only one may be used in each bogie frame; but with the four wheels coupled, four cylinders may be used, one for each wheel. * *

"As the cylinder and bogie frame-work will oscillate on a central fulcrum or other contrivance communicating with the boiler, it may be necessary to carry the steam pipes from the steam chest (which is over the fire-box) to a steam box at or near the bogie pin or fulcrum, and thence distribute it by suitable connecting pipes to the cylinders, or to provide other means to allow of the oscillation of the one part of the locomotive engine upon the other, at the same time to avoid disturbing the steam-pipe connection. The same remark will also apply to the water and waste-steam pipes. I construct the engine with two foot plates, one on either side, one for the driver and the other for the stoker, and there may be a fire-door on either side. The fuel is carried in bunkers along each side of the body of the boiler, or on that side of the engine on which the stoker stands, and the water on the other side, or it may be distributed over the engine, as found most convenient. In order that the fire shall be urged by the draught in the ash-pit caused by the motion through the air I construct it with two openings, one towards each end of the locomotive, and I provide these openings with valve plates or dampers, which can be closed and fixed, so that while traveling the forward damper may be opened, while the rear one is closed. The ash-pit projects below the body of the boiler as usual.

"When it is desired to make a locomotive of great length and with the bogie frames far asunder, I sometimes place one or more pairs of running wheels under or near the fire-box in order to take the weight of the middle part, such wheels being broad flat wheels without flanges. In order to provide for the drag of the engine in the bogie frame and remove it from the fulcrum pin, I provide what I may term "locking plates," being analogous to the locking plates of road carriages, consisting of circular plates or rings, the one fixed on the bogie frame the other on the boiler; near the periphery of the one there is an annular recess, into which a rib fits, projecting from the other plate. This permits of the locking action, and at the same time transmits the tractive force of the engine bogie frame to the boiler and its framework, if any. To prevent strain on the locking plates, as also on the bogie pin, in case of collision, I make the engine bogie frames at the ends nearest the fire-box in the form of an arc described from the fulcrum pin, and fit it in close proximity, but not so as to touch a strongly-braced part of the fire-box and against which any severe thrust would cause, and so, if possible, prevent derangement of the bogie. I also apply a strong angle iron on the boiler, so as to hook or interlock on to a like angle iron fixed on the end of the bogie frame, which have no actual contact except by severe strain."

From this description and the engraving, the construction of the engine will be readily understood. It is just as though the fire-boxes of two locomotive boilers were placed end to end, and rigidly attached to each other. The driving-wheels and cylinders are all attached to what in this country we call "truck," and in England "bogie" frames, which are placed one under each barrel of the boiler, and are attached to it by center-pins in a similar way to that by which the trucks of our ordinary eight or twelve-wheel cars are attached to the bodies. The center-pins of the trucks of Mr. Mason's engine, it will be seen, are placed between the forward or back—as the case may be—and the middle pairs of driving-wheels, and not in the center. This was done because it would have been inconvenient to place the pin over the center axle, and also because the overhanging weight of the cylinders and their attachments required a corresponding weight at the other end of the trucks to balance them. Besides, by putting the center-pin nearer the smoke-boxes of the boilers, there is less overhang of the latter beyond the bearing points. As the cylinders are not attached rigidly to the boilers, but move with the truck, the steam and exhaust pipes must be connected to the boiler by some sort of flexible pipes. These Mr. Mason has arranged somewhat differently from the manner described by Mr. Fairlie. The pipes are shown very distinctly in the engraving, and are made flexible by an ingenious arrangement of stuffing-boxes and ball joints. It was apprehended that this part of the engine might be a source of trouble, but we are told that thus far none whatever has been experienced.

Between the letters A, and N, of the name "Janus," on the engraving, an inclined row of rivets is shown. This indicates the form of the water tanks. The space between these rows of rivets and the cab is intended

for coal, and that beyond and also the tank below the cab are filled with water.

Whatever may be thought of the plan of the engine, no one can fail to be struck with the beauty of the design when compared with the engravings which have been published in the European papers of locomotives of a similar character. Mr. Mason has fully sustained the reputation which is so justly his of being an artist in engineering. The exquisite taste which is shown in all the machinery he builds has been exercised, and with good effect, in the design of the "Janus." It would be difficult to define exactly the nature of this "art faculty." It is a sort of refined mechanical instinct or power of adapting means to ends. It is common sense and sound scientific deduction wrought into wood and iron and brass. There is no useless ornament in such work, but the thing aimed at is accomplished by such direct and straight-forward ways that they assume a grace of their own, of which there are no precedents to be found in the "antique" or "medieval" schools. It is the high art of the nineteenth century, and has—what much that is called "art" at the present day has not—some meaning in it, which redeems it from pettiness and affectation of which the work of our painters seldom, and that of our architects never, are free.

Mr. Mason deserves much credit for his enterprise in building this engine, which we believe is still unsold. We hope that some railroad company with heavy grades will put it to work, and thus make an opportunity of testing it side by side with other engines. Mr. Mason writes:

"The machine will weigh in running order with its tanks and coal bunkers full, from 60 to 70 tons. Notwithstanding the great weight, the machine runs so smoothly on the track that I am quite certain that it is not as destructive to the rails as an ordinary eight-wheeled engine. It will go around a curve of 150 feet radius with as much ease as a 12-wheeled car, and it will haul the load of four ordinary eight-wheeled machines of the same sized cylinders."

—The mechanics of Richmond are blaming the City Council for not allowing the Tredegar Car Company to run cars built by them, on their own wheels, through the streets from the foundry to the Danville depot. The city ordinances require that they should be put on trucks with wheels of sufficient width to prevent the paying from being injured, and to construct such a conveyance would not cost the company much, but they have other plans of their own, and refuse or neglect to provide themselves with it. Their obstinacy and an equal obstinacy on the part of the Council, says a local paper, has stopped all work in this department of the Tredegar, and in consequence more than three hundred hands are thrown out of employment, and much suffering in these poor families is thereby caused.—*New York Evening Post.*

—A late telegram says: "A fierce contest is expected at the next election in May, between Vanderbilt and friends on one side, and Fisk and Gould, with the Erie and Tammany rings, on the other, for the control of the New York Central Railroad. The Erie folks have been buying Central for two or three months, it is stated, and they declare they will be able, with the judicial and political power under their control, to oust Vanderbilt, who, however, laughs at their threats. It is reported that Vanderbilt, by way of retaliation, is moving to expel Fisk and Gould from Erie. At present this promises to be the greatest railroad war ever waged here."

PUBLISHER'S ANNOUNCEMENTS.

The Babcock Extinguisher on the Michigan Central Railroad.

The following is the official report of the fires put out by the Babcock Extinguishers belonging to the Michigan Central Railroad during the month ending January 10, 1871:

December 10.—Chicago and St. Louis car No. 1,053, loaded with twenty bales of cotton, left at Decatur on fire; could not get at fire in cotton with water; put out with Babcock.

December 12.—Water house at New Buffalo took fire; put out with Babcock Extinguisher.

December 15.—Coach No. 28, night express east, took fire at Detroit; put out with Babcock.

December 21.—Repair shop, Michigan City, took fire at four o'clock a. m. from passing engines; put out with Babcock Extinguisher.

December 28.—Gallen—Store of William J. Closson, standing near the railroad buildings, took fire at ten o'clock a. m.; fire had attained considerable magnitude; four other buildings would have burned if this had; put in two minutes with Babcock Extinguisher furnished to station.

January 10.—Lake.—Wood-shed took fire from engine used in sawing wood; well under way; put out in less than two minutes with Babcock Extinguisher.

It is remarkable, says the New York Tribune, that our wealthiest citizens are all at an age when most men are too infirm for affairs, and yet they are not only hale and vigorous, but actively engaged in conducting their immense business. William B. Astor is nearly 78; Alexander T. Stewart, 70; Cornelius Vanderbilt, 76; Daniel Drew, 71; Peter Cooper, 70; George Law, 63; while the majority of our millionaires are over 60.

WANTS.

A CIVIL ENGINEER wants an engagement—Railroad construction preferred—P. O. Box 1165, Rockford, Ill.

A CIVIL ENGINEER who is thoroughly educated in his profession, has had experience in field work for several years, and is especially familiar with levelling and transit surveying, desires an engagement. Address TRANSIT, at the office of the Railroad Gazette.

AN ENGINEER, who has had nearly three years' experience in the use of the instruments, in railroad location and construction, wants a situation as assistant, either in Railroad or Mining Engineering. Address ASSISTANT, Gazette Office.

WANTED—A complete file of the Railroad Advocate published in New York by Zerah Colburn about 15 years ago. A purchaser can be found by applying at this office personally or by letter.

SUBSCRIBERS to the Railroad Gazette who have preserved files from April 1 to October 1, 1870, may have this First Quarto Volume bound, at a charge of \$1.50, by sending them to this office.

WANTED Every Railway Traveler in the United States and the Dominion of Canada wants every railway company to use the Thomas Safety Baggage Check. It is in use on over sixty of the best managed roads in the country and has been during the past three years, and not one piece of baggage to which this check has been attached has been lost or miscarried. Every railroad man upon whose road it is in use says: "We are fast, reliable, after a thorough trial and practical use of the Thomas Safety Baggage Check they both for local and through business it has no equal. It is cheaper, more satisfactory and better adapted to the business than any other check in use." All information in reference to the Thomas Safety Baggage Check will be given by addressing G. F. THOMAS, editor Appleton's Railway Guide, 94, 92 and 90 Grand Street, New York.

ENGINEERING:

A Weekly Illustrated Journal.

This great English engineering journal, which has no superior in the world, will be supplied to American subscribers, postage paid, for

\$8.32 in Gold per Year!

Heretofore subscribers in America have usually paid \$15.00 per year for this paper.

ENGINEERING is a weekly paper, each number containing, besides advertisements, 90 pages of original articles on subjects relating to the various branches of

Civil, Mechanical, Mining and Military Engineering,

profusely illustrated by engravings of the first class. It gives the latest and fullest information concerning

Locomotives, Cars, and other Railroad Rolling Stock,

improvements in their construction and all other railroad machinery, and likewise concerning

Permanent Way and Railroad Construction.

ENGINEERING gives the results of experiments with

NARROW-GAUGE RAILROADS, now attracting so much attention through out the world, and publishes descriptions of the peculiarities of such lines and their rolling stock, accounts of cost, capacity, etc.

THE MOST IMPORTANT American Engineering Structures are illustrated in ENGINEERING.

Subscribers may send their subscriptions either to the Chicago or the New York office of the Railroad Gazette.

Currency sufficient to cover the subscription price, or the gold value of the subscription, may be sent in lieu of gold. This, when gold sells for \$1.10, will be \$9.15.

WE WILL SUPPLY Engineering and the Railroad Gazette **FOR \$13 A YEAR!**

which is two dollars less than American subscribers have usually paid for the same alone.

Send orders with drafts or post-office orders, to

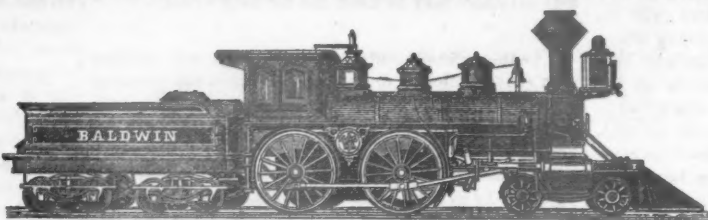
A. N. KELLOGG,
110 & 112 Madison-st., Chicago.

Or to
M. N. FORNEY,
No. 72 Broadway, New York.

Edson's Recording Steam Gauges

1st. These Gauges give an automatically written record of all fluctuations in pressure to which a boiler has been subjected. 2d. They reduce the risk of explosions by prompting a more careful attention to duty. 3d. They economize coal by showing when the firing is not periodically and properly done. 4th. They sound an alarm when any specified pressure is reached, and are adapted for locomotives, marine and stationary boilers. Made and sold by the RECORDING STEAM GAUGE COMPANY, 91 Liberty street, New York.

Baldwin Locomotive Works.



M. BAIRD & CO., Philadelphia.

MANUFACTURERS OF

Locomotive Engines,

Especially Adapted to Every Variety of Railroad Service, including Mining Engines and Locomotives for Narrow Gauge Railways.

All work Accurately Fitted to Gauges, and Thoroughly Interchangeable.

Plan, Materials, Workmanship, Finish and Efficiency, Fully Guaranteed.

M. BAIRD.
GEO. BURNHAM.

CHAS. T. PARRY.
EDW'D H. WILLIAMS.

WM. P. HENSZEY.
EDW'D LONGSTRETH.

GRANT

Locomotive Works!

PATERSON, N. J.

New York Office, - - 48 Wall Street.



Dealers in

R. R. Cross-Ties, Telegraph Poles,

FENCE POSTS, BRIDGE TIMBER,

Piles, Hard-wood Plank, &c., &c.,

To which the Attention of Railroad Contractors and Purchasing Agents is respectfully called.

REFER TO:—Jas. M. Walker, Chicago, Pres't L. & G. R. R.; Jas. E. & Wm. Young, Chicago, Railroad Builders; H. J. Higgins, Purchasing Agent C. B. & Q. R. R.; and Railroad Officers and Purchasing Agents generally.

MARSH & GOODRIDGE,
256 South Water St., Chicago.

J. E. FRENCH.

W. S. DODGE.

D. W. CROSS.

Winslow Car Roofing Company.

PATENT IRON CAR ROOFS.

Established, 1859.

No. 211 Superior St. CLEVELAND, O.

Over 20,000 Cars covered with this Roof! We claim that these Roofs will keep Cars dry, and will last as long as the Cars they cover without any extra expense after once put on.

SEND FOR CIRCULAR.

Charles J. Pusey,

78 & 80 BROADWAY, NEW YORK.

American and English Rails,

LOCOMOTIVES AND CARS FISH-PLATES, SPIKES, &c.

—SOLE AGENT FOR—

Atkins Brothers' Pottsville Rolling Mills, and G. Buchanan & Co., of London.

Special attention given to filling orders for small T and STREET RAILS, of every weight and pattern. P. O. Address—Box 5222.

OLD RAILS BOUGHT OR RE-ROLLED, AS DESIRED.

Portage, Winnebago & Superior Railroad.

NOTICE TO CONTRACTORS.

Proposals will be received at the office of Capt D. W. WELLMAN, Chief Engineer, at Menasha Wis., until

Twelve o'clock Noon, on Wednesday, March 1st, 1871,

for the Grading, Masonry and Bridging on that portion of the Portage, Winnebago & Superior Railroad lying between Doty Island and the Wisconsin River at Stevens' Point, a distance of about sixty-four (64) miles.

Proposals will be received for the work in each section (of about one (1) mile), or for the whole work; but parties making proposals for the whole will be required to specify the prices for work on each section.

Blank forms, setting forth the different items for which proposals will be received, will be furnished on application; and Plans, Profiles and Specifications can be seen on and after Monday, January 23d, at the office of the Chief Engineer, and at the office of the undersigned, in Ogden Building, corner Clark and Lake streets, Chicago, Ill., on and after Monday, February 6th, 1871.

Proposals, accompanied by Plans, are also invited for the Construction of the Railroad Bridge across Wolf River—to be either of Wood or Iron—consisting of one span of one hundred and fifty (150) feet, and one draw of sixty (60) feet, clear space. The bridge to be first class in every particular, and able to meet the requirements of a first-class road.

Separate proposals will also be received for the whole of the Span Bridging on the above-described work.

Right is reserved to reject all bids not deemed advantageous to the Company.

PHILLIPS & COLBY, Contractors.
Chicago, January 18, 1871.

TRIAL.

No. W. F. Garrison, Box 6732, N. Y.

Send THE NATION for two months (8 num

bere from the last) to.....

Procured by.....

On receipt of fifty cents and this blank, filled out, the Nation will be sent to your address for two months (8 numbers), postage prepaid.

"The Nation I esteem as one of the very best, highest-toned moral newspapers in the country."—From a Sermon by Rev. Henry Ward Beecher.

"I regard the Nation as the best journal in America, and not only so, but better, on the whole, than any in England."—Prof. Goldwin Smith.

"I have never taken a weekly newspaper which in all its departments is so satisfactory as the Nation."—Hon J. D. Cox, (Secretary of the Interior.)

Terms \$5 per annum. Clergymen \$4.

SNOW'S PATHFINDER

RAILWAY GUIDE

CONTAINS THE TIME-TABLES

Of all New England Roads. Published under authority of the R. R. Superintendents.

MONTHLY, WITH WEEKLY SUPPLEMENT.

\$2.50 per annum. 10 cts. single copy.

GEO. K. SNOW & BRADLEE, Publishers

NO. 5 LINDALL STREET, BOSTON.

THE

Commercial & Financial Chronicle,

PUBLISHED WEEKLY

IN NEW YORK,

— IS THE —

Standard Financial Newspaper of the Country.

WM. U. THWING, PATTERN

—AND—

Model Maker!

Calhoun Place, Near of No. 120 Dearborn Street, Chicago, Third Floor.

Employing none but the best workmen, and having superior facilities, I am prepared to do the best work (using the best materials) at low figures, and guarantee satisfaction. Patent Office Models a specialty.

SAMUEL HUSTON, Pres't.

WM. BUTCHER, Gen. Sup't.

H. P. RUTTER, Sec'y and Treas.

THE WILLIAM BUTCHER STEEL WORKS, OF PHILADELPHIA, PA.

Offices:—407 Walnut St., Phila.; 59 John St., New York;
18 Custom House St., Boston.

**CRUCIBLE CAST STEEL TYRES,
AXLES, FIRE BOX and BOILER PLATE, REVERSIBLE FROGS,
CROSSINGS, SPRING STEEL.**

SPECIAL TOOL STEEL, SHAFTS, AND ALL KINDS OF STEEL FORGINGS.

P. O. Box 3066 New York.

WM. TOOTHE, General Sales Agent.

UNION TRUST CO., OF NEW YORK.

No. 73 Broadway, cor. Rector St.

Capital, - - 1,000,000.

[All paid in and securely invested.]

INTEREST ALLOWED ON DEPOSITS, which
may be drawn at any time.

This Company is by law and by the order of the
Supreme Court made a legal depository of money.
It will act as Receiver in cases of litigation, take
charge of, and guarantee the safe keeping of all
kinds of Securities, and collect coupons and
interest thereon.

It is authorized by law to accept and execute all
trusts of every description, in reference to both
real and personal property committed to them by
any person or corporation, or transferred to them
by order of any of the Courts of Record, or by any
Surrogate.

It is especially authorized to act as Register and
Transfer agent and as Trustee for the purpose of
issuing, registering or countersigning the certifi-
cates of stock, bonds or other evidences of debt of
any corporation, association, municipality, State
or public authority, and will pay coupons and divi-
dends on such terms as may be agreed upon.

In giving special prominence to this department
its business, attention is particularly called to
the paramount advantage of employing this com-
pany in the capacity of AGENT, TRUSTEE, RECEIVER
OR TREASURER, in preference to the appointment of
INDIVIDUALS. A guarantee capital of ONE MILLION
DOLLARS specially invested by requirement of its
charter, and a perpetual succession; a central and
permanent place of business, where business can
be transacted daily, without disappointment or
delay; its operations directed and controlled by a
responsible Board of Trustees; and its entire man-
agement also under the supervision of the Supreme
Court and the Comptroller of the State.

Permanent Counsel and Responsible Super-
vision, Guaranty Security and Business Conven-
ience and Facilities, may therefore be strongly
urged in its favor on the one hand, against the
Uncertainty of Life, the Fluctuations of Business,
Individual Responsibility and General Inconven-
ience on the other.

ISAAC H. FROTHINGHAM, President.

AUGUSTUS SCHELL, Vice-President.
HENRY K. BOGERT, Vice-President.

TRUSTEES.

A. A. LOW, JOHN V. L. PRUYN,
HORACE F. CLARK, BENJ. H. HUTTON,
DAVID H. ADLEY, JAS. A. McLAIN,
EDWARD B. WESLEY, W. WHITEWRIGHT, Jr.
GEORGE WILLIAMS, HENRY S. STOKES,
J. B. JOHNSON, HENRY E. DAVIES,
GEO. B. CARHART, SAMUEL WILLETS,
PETER B. SWEENEY, CORNELIUS D. WOOD,
JAS. M. WATERBURY, S. B. CHITTENDEN,
FREEMAN CLARK, DANIEL C. HOWELL,
ALASA J. PARKER, GEORGE W. CUYLER,
HENRY A. KENT, JAMES FORSYTH,
WILLIAM F. RUSSELL, R. J. DILLON,
S. T. FAIRCHILD.

CHARLES T. CARLTON, Secretary.

ANDREW CARNEGIE, ANDREW KLOMAN,
FRANK M. CARNEGIE, HENRY PHIPPS, Jr.

CARNEGIE, KLOMAN & CO.,

PROPRIETORS

Union Iron Mills,

OF PITTSBURGH, PA.

Sole Manufacturers, under our own Patents, of

**IMPROVED "T" BEAMS,
CHANNEL BARS.**

Best Quality of

LOCOMOTIVE & CAR AXLES.

("KLOMAN" Brand.)

"Linville & Piper's Patent"

**Round and Octagonal HOLLOW
WROUGHT IRON POSTS,**

—AND—

"Upset" BRIDGE LINKS

GENERAL WESTERN OFFICE:

No. 13 Fullerton Block, Dearborn-St.,

CHICAGO, ILLINOIS.

THE UNION IRON MILLS manufacture all
sizes of Pipe Iron, Merchant Bar, Forgings, Ham-
mers and Rolled Locomotive and Car Axles, from
the very best iron. Splice Bars (or Fish Plates,) to
suit all Patterns of Rails, Bridge Iron and Bolts,
"T" Beams, Girder Iron, Channel Iron, &c.

WALTER KATTE, Western Agent.

KELLOGG BRIDGE COMPANY,

OF BUFFALO, N. Y.

Manufacturers of all kinds of

Wrought Iron Truss Bridges,

Iron Roofs and Viaducts.

Plans and prices sent on application. Ad-
dress KELLOGG BRIDGE CO., Buffalo, N. Y.

CHAS. KELLOGG, President.

CHAS. F. WADSWORTH, Vice-Pres.

C. C. HODGES, Sec'y and Treas.

THOS. M. GRIFFITH, Sup't.

RUFUS BLANCHARD,

146 Lake St., Chicago,

Has Issued a NEW STYLE of

MAPS!

IN FLEXIBLE CASES.

Which are both cheap and convenient. The follow-
ing States are now ready: Illinois, Iowa, Missouri,
Kansas, Nebraska, Minnesota, Wisconsin, Indiana,
Michigan and Ohio. Mailable on receipt of 25
cts. They show the counties, towns and rail-
roads and are fine specimens of workmanship.

TO ADVERTISERS.

THE BEST MEDIUMS

OF GENERAL

Western Circulation!

KELLOGG'S LIST,

CONTAINING

270 Country Papers.

LEADING COUNTY PAPERS.

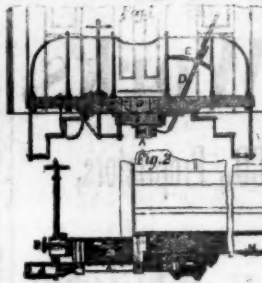
For further particulars, call upon or address the
proprietor of this paper,

A. N. KELLOGG,

99 & 101 Washington St.,

CHICAGO, ILL.

Miller's Trussed Platforms,



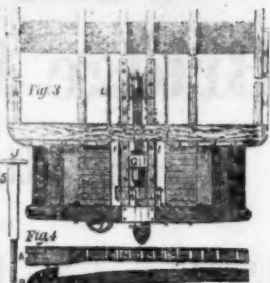
COMPRESSION

BUFFERS

AUTOMATIC

COUPLERS,

FOR
Railroad Cars.



PATENTED, MARCH 31st, 1863, JANUARY 31st, 1865, AND JULY 24th, 1866.

OFFICE—No. 231 Broadway, Rooms 4 and 5, opposite City Hall Park, N. Y.

The advantages gained by the use of these improvements may be briefly stated as follows:

- 1st. The platforms are held in a plane with the
sills on the cars.
- 2d. The platforms cannot be broken by any or-
dinary accident.
- 3d. Telescoping is impossible.
- 4th. Any required compression may be attained,
to prevent accidents by oscillation.
- 5th. No links and pins are required, and no one
is required to go between cars to couple them.
- 6th. The platforms may be held as close together
as desired.
- 7th. By close coupling the train is shortened.
- 8th. They will not accidentally uncouple.
- 9th. They may be uncoupled "without shutting
off" to make a flying switch.
- 10th. They are strong; the train will not "break
in two" at starting or while running.
- 11th. They cause the train to move steadily and
not jerk in starting or stopping.
- 12th. They work well at great variations of height.
- 13th. They will couple with all kinds of "draw-
heads" and "couplers."
- 14th. They are cheap and durable.
- 15th. Injury to men when coupling cars is en-
tirely prevented.
- 16th. Injury to persons by falling between cars
is entirely prevented.
- 17th. Injury to persons and to cars by "telecop-
ing" is entirely prevented.
- 18th. Injury to persons and to cars by "oscilla-
tion" is entirely prevented.
- 19th. The great steadiness of the cars, produced
by compression, render sleeping cars much more
desirable.
- 20th. "Train Brakes" are rendered more valua-
ble by the non-existence of "slack" in the train.

No Railroad Manager who comprehends the case fails to give these improvements a "trial"! And all those who have tried them have adopted them.

Prices of Materials, &c.

Coupling Hooks.....	\$24.50 each.
Buffers.....	11.00 "
Levers.....	2.00 "

Patterns in Full Sets, or Single Pieces, for all castings used in the improvements, and Templates for
Wrought Irons, AT COST. Drawings, Tracings, and superintendence of work are not charged for.
These articles will be promptly furnished and shipped to any part of the country on short notice.
Orders must state what routes the goods are to go, and whether by express or as ordinary freight.

H. MILLER.

CRERAR, ADAMS & CO.,

MANUFACTURERS AND DEALERS IN

Railroad Supplies!

—AND—

CONTRACTORS' MATERIAL.

11 and 13 Wells Street,

CHICAGO, ILL.

Manufacturers of IMPROVED HEAD-LIGHTS for Locomotive
and Signal Lamps, Car and Station Lamps, Brass Bon-
nets, Brass Mouldings, Cylinder Heads, and Car Trimmings, &c.



Passaic Mining & Manu-
facturing Com. any.
Delamater Iron Works.
Peop's Line Steam-ra,
New York.
Collins Company, Collins-
ville, Ct.
Poughkeepsie Iron Works
Clark Thread Co., New
ark, N. Y.
Brooks' Locomotive
Works, Dunkirk, N. Y.
Lane & Bodley, Cincin-
nati, O.
Memphis and St. Louis
Packet Co., St. Louis.

REFERENCES.

THE PERFECT LUBRICATOR
A sure preventive of rust and corrosion on journals.
Hasten times the lubricating quality of any oil.
400° F., 50° below zero, acids or bases do not
affect or change its wonderful, unique nature.
Forms on bearing surfaces a glass of unequal-
led smoothness, which economizes power 50 per
cent.; reduces friction to a minimum, and prevents
heat, wear, strain, and repairs of machinery.
Send for envelope sample and circular to
AMERICAN GRAPHITE CO.

Barney & Smith Mfg. Co.,
Car Builders, Dayton, O.
Jackson & Sharp Co., Car
Builders, Wilmington,
Del.
N. Y. & Oswego Millland
R. R. Co., Oswego.
Bome, Watertown & On-
dewburgh R. R. Bome.
Lake Shore & Michigan
Southern R. R., Leve-
land, O.
Kansas Pacific R. R., St.
Louis.
Western & Atlantic R. R.,
Atlanta, Ga.

J. M. BRADSTREET & SON'S

Mercantile Agency.

ESTABLISHED 1840.

THE NEW VOLUME OF REPORTS IS NOW ISSUED!

AND WILL BEAR THE CLOSEST SCRUTINY BOTH AS TO ITS

Completeness and Accuracy.

Parties desiring to make an Examination, can call at the

Office, cor. Dearborn and Lake Sts.,

OR WILL BE WAITED UPON BY A CANVASSER, BY SENDING THEIR ADDRESS.

J. M. BRADSTREET & SON.

J. M. KEESSE, Sup't.

ALBERT C. McNAIRY, President.

HENRY M. CLAFLEN, Vice-Pres't & Treas.

CLEVELAND Bridge & Car Works,

THE McNAIRY & CLAFLEN MANUF'G CO., Proprietors,

BUILDERS OF

Railway and Highway Bridges,

Roofs, Turn Tables, Transfer Tables,

OF IRON AND WOOD,

RAILROAD PASSENGER & FREIGHT CARS,

STREET RAILROAD CARS.

Post's Patent Iron and Combination Bridges, Howe Truss Bridges with
Patent Iron Clamp, Street Railroad Cars with Higley's
Patent Running Gear and Brake.

OFFICES: Waring Block, cor. Bank and St. Clair Sts., | WORKS: On Wason, Hamilton and Lake Sts.,

CLEVELAND, OHIO.

HARVEY T. CLAFLEN, Sup't.

JOHN COON, Sec'y.

SIMEON SHELDON, Engineer.

L. B. BOOMER, Pres.

H. A. RUST, Vice Pres.

W. E. GILMAN, Secretary.

American Bridge Company,

Manufacturers and Builders of

BRIDGES, ROOFS,

Turning Tables, Pivot Bridges, Wrought Iron
Columns, Heavy Castings, and General
Iron and Foundry Work.

For Railway and Road Bridges, this Company employs the fol-
lowing well-established systems, viz: For Bridge Superstructures.—Post's Patent Diagonal
Iron Truss; Plate and Trussed Girders; Post's Patent Diagonal Combination Truss; Howe's Truss and
any other desired systems. For Bridge Substructures.—Pneumatic, Screw Piles and Masonry.

Descriptive Lithographs furnished upon application. Plans, Specifications and Estimates,
together with Proposals, will be made and submitted, when desired.

WORKS,

OFFICE.

Cor. Egan and Stewart Avenues. Rooms 1, 2 & 3, 157 LaSalle St.

Address

THE AMERICAN BRIDGE CO.,

No. 157 LaSalle St., Andrews' Bldg., Chicago.

L. C. BOYINGTON, Gen. Agent.

M. LASSIG, Gen. Supt.

WELLS, FRENCH & CO., Bridge Builders and Contractors.

General Western Agents for the KELLOGG BRIDGE CO., Buffalo, N. Y.,
Under the direction of CHAS. KELLOGG, President.

We are prepared to furnish Railroad and Highway Bridges of the Howe Truss
System; Iron Railroad and Highway Bridges
of the Pratt Truss System.

IRON ROOFS, TURN-TABLES & DRAW-BRIDGES.

Plans, specifications and estimate of cost, furnished on application at our office. PATENT
IRON CLAMPS AND KEYS; BOLTS AND DIMENSION TIMBER furnished to order.

WELLS, FRENCH & CO., 92 Dearborn St., Chicago.

J. R. LINVILLE, PRESIDENT.

J. L. PIPER, GEN. MANAGER.

A. G. SHIFFLER, SUP'T & TREAS.

The Keystone Bridge Company OF PITTSBURGH, PENN.

Office and Works, 9th Ward, Pittsburgh, Pa.

Philadelphia Office, 426 Walnut Street.

GENERAL WESTERN OFFICE:—13 Fullerton Block, 94 Dearborn St.,
CHICAGO, ILL.

This Company possesses unrivaled facilities for manufacturing and erecting every description of
Iron and Wooden Railway and Road Bridges, Roofs, Turn-Tables and Build-
ings, "Linville and Piper" Patent Iron Bridges, Self-Sustaining Pivot Bridges,
Suspension Bridges, and Ornamental Park Bridges. Contractors for Wooden or Iron
Bridges of any pattern, as per plans and specifications. Circulars sent on application.

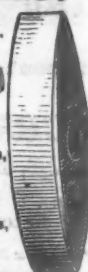
WALTER KATTE, ENGINEER.

A. D. CHERBY, SECRETARY.

NELSON TOOL WORKS.

Trade Mark
H. NELSON.

157 East 32d St., N. Y.

Trade Mark
H. NELSON.

Mining & Paving Tools,
H. Nelson's Solid Eyed Pick,
Kip Hammers,
Stone Breakers,
Masons' Peen & Scabbling Hammers,
Hand or Mash Hammers,
Chipping Hammers,
Flangers' Hammers,

Shackel Bars,
Block Stone Sledges,
Mauls,
Sledges,
Blacksmiths' Sledges,
Fullers, all sizes,
Swedges, all sizes,
Mill Picks, Crow Bars,
Rail Tongues.

Smiths' Hand Hammers,
Coopers' Hammers,
Masons' Stone Axes,
File Cutters' Hammers,
Striking Hammers,
Masons' Brick Hammers,
Horse Shoers' Tools,
Rail Tongues.

HAMMERS of all kinds made to order, on receipt of Pattern or Drawing.

Special attention paid to Railroad Work.

Send for Illustrated Catalogue.



The Lightest Running,

EASIEST RIDING,

— AND —

Most Economical

STREET CAR

IN USE.

HIGLEY'S PATENT

Street Car Running Gear

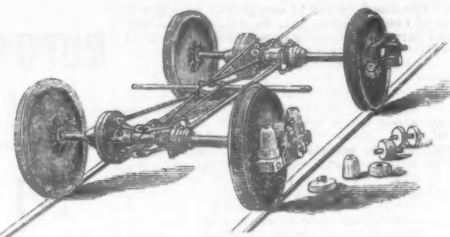
— AND —

BRAKE,

Made and Sold by

The McNairy & Claffen Manuf'g Co.,

CLEVELAND, O.



JNO. L. GILL, JR.

D. W. C. BIDWELL.

CAR WHEEL WORKS.

Gill & Bidwell,

— MANUFACTURERS OF —

CHILLED WHEELS,

For Locomotives, Passenger, Freight and Coal Cars.

Office, 143 Water Street, |

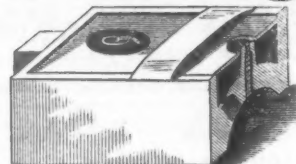
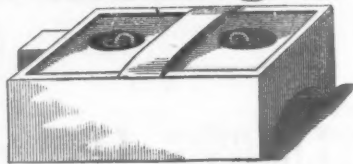
COR. CHERRY ALLEY.

PITTSBURGH, PA.

JOHN L. GILL, JR., late Manufacturer, at Columbus, O., of the CELEBRATED GILL WHEEL.

WENDELL'S PATENT

Self-Oiling Journal Bearing,

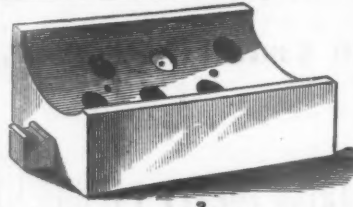


1.

2.

FOR RAILROAD CARS, LOCOMOTIVES AND MACHINERY.

As the perfect lubrication of the journals of railroad cars is a matter of great importance in the
running expenses, as well as saving of time lost by heated journals, the SELF-OILING JOURNAL
BEARING is offered as the most simple and effective means of meeting this want. The bearing is made
in the usual shape, and requires no alteration of
the box, and is so constructed that while the whole
strength and wearing metal is preserved, a chamber
is formed within for containing the oil, which is ap-
plied to the journal by wicks passing through tubes
cast in the bearing, as seen in cuts 1 and 2, also by
pads composed of asbestos, black lead and paper pulp
or other slightly porous material, fitted into recesses
formed in the face of the bearing, extending nearly
through to the oil chamber, with smaller openings
into the same. Through these pads the oil filters
slowly, and always presents an oiled surface to the
top of the journal, when and where it is most needed,
and where in the ordinary bearing it receives the
least. See cuts 2 and 3.



3.

The Wendell Patent Journal Bearing Company,
P. O. Box 5118. Office, 59 John St., New York.

PITTSBURGH CAST STEEL SPRING WORKS.

A. French & Co.,

Manufacturers of Extra Tempered, Light Elliptic

CAST STEEL SPRINGS,

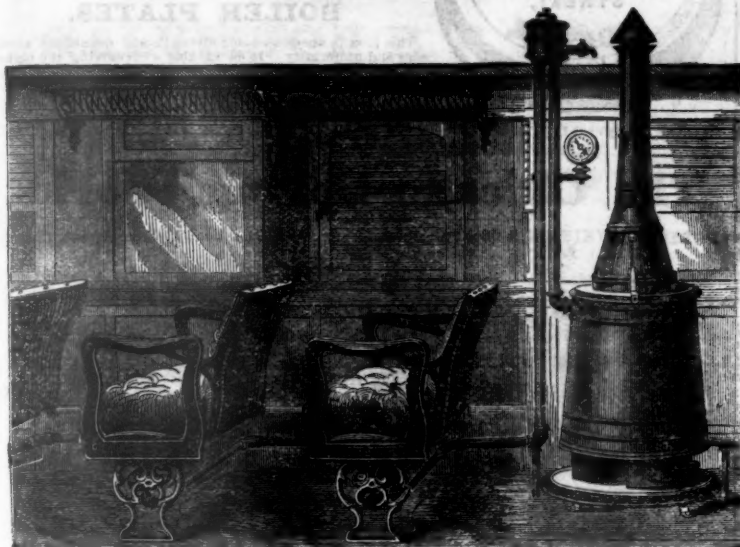
FOR RAILROAD CARS AND LOCOMOTIVES,

FROM BEST CAST STEEL.

OFFICE AND WORKS:—Cor. Liberty and 21st Sts., PITTSBURGH, PA.

CHICAGO BRANCH, 88 Michigan Ave.

WARMING AND VENTILATING Railroad Cars BY HOT WATER.



BAKER'S PATENT CAR WARMER.—One way of Applying it.

A very simple, safe and efficient plan for

Warming Railway Carriages!

—BY—
HOT WATER PIPES,

Which Radiates the Heat Directly at the Feet of Each Passenger without the Necessity of Going to the Stove to Get Warmed!

All the finest Drawing-Room and Sleeping Cars in the United States have it, or are adopting it. Full descriptive Pamphlets furnished on application.

Baker, Smith & Co.,

Cor. Greene and Houston Sts., N. Y., and 127 Dearborn St., Chicago.

THE LEBANON MANUFACTURING COMPANY,
LEBANON, PENNSYLVANIA,

IS PREPARED TO BUILD AT SHORT NOTICE,

HOUSE, GONDOLA, COAL, ORE,

AND ALL OTHER KINDS OF

CARS!

Also, IRON and Every Description of CAR CASTINGS Made to Order.

DR. C. D. GLONINGER, President.

J. M. GETTEL, Superintendent.

HUSSEY, WELLS & CO.,

MANUFACTURERS OF ALL DESCRIPTIONS OF

CAST STEEL.

BEST REFINED STEEL FOR EDGE TOOLS.

Particular attention paid to the Manufacture of

Steel for Railroad Supplies.**HOMOGENEOUS PLATES,**

For Locomotive Boilers and Fire Boxes.

Smoke Stack Steel, Cast Steel Forgings,**FOR CRANK PINS, CAR AXLES, &C.**

Also, Manufacturers of the Celebrated Brand,

"HUSSEY, WELLS & CO. CAST SPRING STEEL."

For Elliptic Springs for Railway Cars and Locomotives.

Office and Works, Pittsburgh, Pa.

BRANCH WAREHOUSES:

88 MICHIGAN AVENUE, CHICAGO.

139 and 141 Federal St., BOSTON. | 30 Gold St., - - - NEW YORK.

FERRIS & MILES, Steam Hammers & Machine Tools

24th and Wood Streets, PHILADELPHIA.

THE STEAM HAMMER AS IT SHOULD BE!

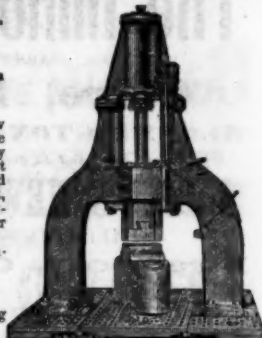
Simple in Construction—Powerful in Action—Convenient in Handling—Moderate in Price!

These Hammers have our Patent Skew Ram, which secures the most extensive die surface, and our patent valve gear; by which is accomplished, with the most perfect adjustment, either the heavy dead blow for drawing down work, or the light, quick blow for finishing, AND THIS WITH ONLY TWO MOVING PIECES—NOTHING TO GET OUT OF ORDER.

All sizes, from 100 lbs. upwards, with single or double frames.

ENGINE LATHES,

Extra Strong and Heavy, capable of doing the heaviest and most accurate work.

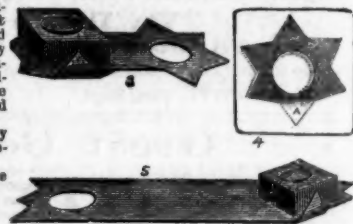
Also, our **PATENT SCREW-CUTTING LATHES**, which will do either general turning or screw cutting, without change of gear-wheels.

THE UNION PATENT STOP WASHER,

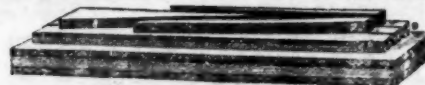
Manufactured at Coatesville, Chester Co., Pa., on the line of the Pennsylvania Central R. R., has now stood the test of practical use on the above road, the Philadelphia, Wilmington & Baltimore and Philadelphia & Reading Railroads, for the past two years, and proved itself to be what is claimed for it—a perfect security against the unscrewing or receding of nuts. Its simplicity, efficiency and cheapness over any other appliance for the purpose should recommend it to the attention of all persons having charge of Railroad tracks, cars and machinery.

It is especially adapted to, and extensively used by leading Railroads of the country for the purpose of securing nuts on railway joints.

The accompanying cuts show the application of the Washer. For further information, apply to

A. GIBBONS, Coatesville, Pa.

MANSFIELD ELASTIC FROG COMPANY



OF CHICAGO.

AMOS T. HALL, President.

J. H. DOW, Superintendent

Are now prepared to receive and promptly execute orders for RAILROAD FROGS and CROSSINGS warranted to prove satisfactory to purchasers.

For DURABILITY, SAFETY and ELASTICITY—being a combination of Steel, Boiler Plate and Wood—they are UNEQUALED, as Certificates of Prominent Railroad Officials will testify.

The SAVING TO ROLLING STOCK AND MOTIVE POWER is at least equal to double the cost of the FROG. Letters should be addressed to

CRERAR, ADAMS & CO., Gen'l Agents,**No. 18 Wells Street, CHICAGO.**

The New Jersey Steel and Iron Co.,
TRENTON, N. J., and 17 BURLING SLIP, NEW YORK,

WOULD CALL SPECIAL ATTENTION TO THEIR

MARTIN STEEL!

Acknowledged by all who have used it to be the best material now made for

Firebox Plates, Locomotive Crank Pins, Piston Rods, Axles,

And all the finer machine purposes, such as

Rollers for Cotton Machinery, Lathe Screws, Sewing Machine Work, &c., &c.

The special features of this Steel are its REMARKABLE TOUGHNESS, its softness and entire freedom from hard spots, which obviate the necessity of annealing before turning.

The process by which this Steel is made differs entirely from any other in use, enabling it to be sold at lower prices than any other good steel, while it possesses properties hitherto unknown, and of the greatest importance for many uses.

Geo. C. Clarke & Co.,

FIRE, INLAND AND OCEAN MARINE

INSURANCE AGENCY.

15 Chamber of Commerce, Chicago.

New England M. M. Insurance Co., of Boston,
ASSETS \$1,197,000.

Independent Insurance Company, - of Boston,
ASSETS \$680,000.

North American Fire Ins. Co., of New York,
ASSETS \$800,000.

Excelsior Fire Insurance Co., - of New York,
ASSETS \$840,000.

Fulton Fire Insurance Company, of New York,
ASSETS \$400,000.

Home Insurance Company, - of Columbus, O.
ASSETS \$515,000.

GENERAL FREIGHT DEPARTMENT.

The Illinois Central Railroad

ARE PREPARED TO TAKE FREIGHT FOR

**Cairo, St. Louis, Peoria,
Bloomington, Springfield, Jacksonville,**

And All Points in the Central and Southern parts of the State;

MOBILE & NEW ORLEANS BY RAIL OR RIVERAnd ALL POINTS on the MISSISSIPPI below CAIRO. Also, to
Freeport, Galena and Dubuque.Freight Forwarded with Promptness and Despatch, and
Rates at all times as LOW as by any other Route.BY THE COMPLETION OF THE BRIDGE AT DUNLEITH,
THEY ARE ENABLED TO TAKE FREIGHT TO ALL POINTS WEST OF DUBUQUE
WITHOUT CHANGE OF CARS!DELIVER FREIGHT IN CHICAGO ONLY at the FREIGHT DEPOT of the Com
pany, foot of South Water St. Parties ordering Goods from the East should have the packages marked**"Via Illinois Central Railroad."**For THROUGH BILLS OF LADING, and further information,
apply to the LOCAL FREIGHT AGENT at Chicago, or to the undersigned.

M. HUGHITT, Gen. Supt.

J. F. TUCKER, Gen. Freight Agt.

Great Central Route.

"BLUE LINE."

ORGANIZED JANUARY 1, 1867.

1871.



1871.

OWNED AND OPERATED BY THE

**Michigan Central, Illinois Central, Chicago, Bur-
lington & Quincy, Chicago & Alton, Great
Western (of Canada), New York Central,
Hudson River, Boston & Albany, and Providence
and Worcester Railroads.**The "BLUE LINE" is the only route that offers to shippers of freight the advantages of an
unbroken gauge through from Chicago to the Seaboard, and to all Interior Points on the line of Eastern
Connections beyond Suspension Bridge and Buffalo. All Through Freight is then transported between
the most distant points of the route in interest.**WITHOUT CHANGE OF CARS!**The immense freight equipment of all the roads in interest is employed, as occasion requires, for the
through service of this line, and has of late been largely increased. This line is now prepared to extend
facilities for the transit and delivery of all kinds of freight in Quicker Time and in Better Order than
ever before.**The Blue Line Cars**are all of a solid, uniform build, thus largely lessening the chances of delay from the use of cars of a
mixed construction, and the consequent difficulty of repairs, while remote from their own roads. The
Blue Line is operated by the railroad companies who own it, without the intervention of intermediate
parties between the Roads or Line and the public.Trains run through with regularity **IN FOUR OR FIVE DAYS** to and from New York and
Boston. Especial care given to the Safe and Quick Transport of Property Liable to Breakage or Injury,
and to all **Perishable Freight.**Claims for overcharges, loss or damage, promptly settled upon their merits. Be particular and direct
all shipments to be marked and consigned via**"BLUE LINE."**FREIGHT CONTRACTS given at the offices of the company in Chicago, New York
and Boston.

J. D. HAYES, GEN. MANAGER, .. Detroit	
C. E. NOBLE,	349 Broadway, N. Y.
GEO. E. JARVIS, ..	P. K. RANDALL, 69 Washington St., Boston.
N. D. MUNSON, ..	W. W. STREET, 91 Lake St., Chicago.
THOS. HOOPS, GEN. FR'T AGT. Michigan Central Railroad, Chicago.	J. JOHNSON, ..
A. WALLINGFORD, AGT. M. C. & G. W. R. R., No. 91 Lake St., Chicago.	Cairo, Ill.
N. A. SKINNER, Freight Agent Michigan Central Railroad.	

Empire Line.**THE EMPIRE TRANSPORTATION COMPANY'S
Fast Freight Line to the East****TO THE COAL AND OIL REGIONS,
Via Michigan Southern, Lake Shore, and Philadelphia & Erie R. R.'s,
WITHOUT TRANSFER!**

Office, No. 72 Cassalle Street, Chicago.

GEO. W. RISTINE, Western Superintendent, Cleveland, Ohio.	
W. G. Van Demark, 265 Broadway, New York.	E. L. O'Donnell, ..
G. R. McCulloch, 41 South 5th St., Philadelphia.	Wm. F. Smith, ..
JOHN WHITTAKER, Pier 14 North River, New York.	Erie, Penn.

JOSEPH STOCKTON, Agent, Chicago.

W. T. HANCOCK, Contracting Agent.

WM. F. GRIFFITHS, Jr., Gen. Freight Agent, Philadelphia.

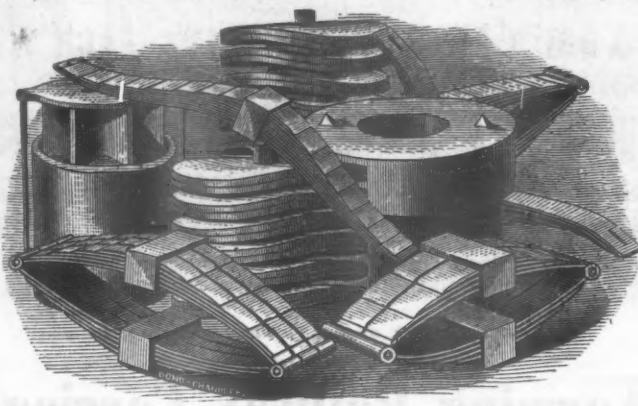
**TAYLOR BROTHERS & CO.****CAST STEEL LOCOMOTIVE TYRES,
Best Yorkshire Bar Iron
— AND —
BOILER PLATES.**This Iron is unequalled for strength and durability, sound
ness and uniformity. It is capable of receiving the highest
finish, which renders it peculiarly adapted to the manufacture
of Locomotive and Gun Parts, Cotton and other Machinery
Ch in Bolts, &c.

Sole Agency for the United States and Canada.

The Chicago Spring Works.

McGREGOR, LUTKINSON & CO., Proprietors.

OFFICE: No. 128 Lake Street, Chicago.

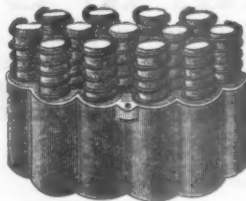


MANUFACTURERS OF

EXTRA TEMPERED LIGHT ELLIPTIC CAST STEEL SPRINGS AND THE "DANIELS" PAT. CAR SPRING.

Union Car Spring Mfg Co.

Sole Proprietors of the



Wool-Packed Spiral.



Hebbard.

HEBBARD CAR SPRING!

Offices: No. 4 Dey St., New York, and 19 Wells St., Chicago.

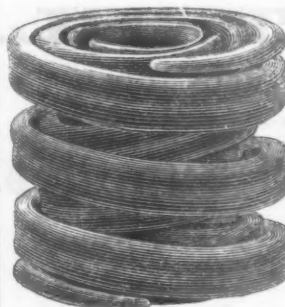
FACTORIES: JERSEY CITY, N. J., and SPRINGFIELD, MASS.

**Vose, Dinsmore & Co.,
NATIONAL SPRING WORKS,**

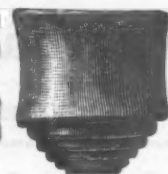
MANUFACTURERS OF

VOLUTE BUFFER, INDIA RUBBER, RUBBER CENTER
SPIRAL, COMPOUND SPIRAL, "DINSMORE,"

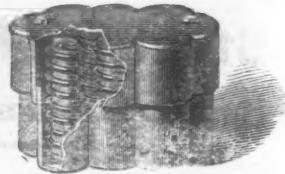
AND OTHER

RAILWAY CAR SPRINGS.

"Dinsmore" Spring.



Volute Buffer Spring.



Group Rubber Center Spiral Spring.

No. 1 Barclay St., NEW YORK.

No. 15 La Salle St., CHICAGO.

WORKS ON 129th AND 130th STREETS, NEW YORK

GEO. WESTINGHOUSE, Jr., Pres.

ROBERT PITCAIRN, Treas.

RALPH BAGALEY, Secretary

Westinghouse Air Brake Company,

OF PITTSBURGH. Incorporated by the State of Pennsylvania, 1869.

MANUFACTURERS OF

THE WESTINGHOUSE AIR BRAKE!A simple, cheap and effective invention, whereby the entire control of a train of cars is placed in
the hands of the Engineer. It is in daily use on a number of the leading Railroads, and is recommend-
ed by the most prominent railroad mechanics in the country as an actual necessity.A Trial Train furnished to any Railroad Company, to be paid for only when found
satisfactory. Full information furnished on application.

KANSAS CITY TO SOUTHWESTERN KANSAS. THE SHORTEST ROUTE

IS VIA THE

Leavenworth, Lawrence, —AND— GALVESTON R. R. LINE.

Two Distinct Lines of Railway from Kansas City, Mo. & Lawrence, Kan.
UNITING AT OTTAWA, AND FROM THENCE A TRUNK LINE TO

INDIAN TERRITORY!

Passing Through the Finest Towns and Traversing the Richest Portion of this Splendid State.

TWO DAILY PASSENGER TRAINS EACH WAY,
Making Close Connection at Kansas City with all Roads East,

And at THAYER, (Southern Terminal), with

SOUTHWEST STAGE CO.'S OVERLAND COACHES,
For WICHITA, SANTA FE and TEXAS.

500,000 Acres Choice Farming Lands!

FOR SALE UPON THE MOST REASONABLE TERMS.

This Road also Passes through the Best Portion of the
Celebrated Osage Reservation!
NOW OPEN FOR SETTLEMENT.

Ask for Tickets via **LEAVENWORTH, LAWRENCE & GALVESTON R. R.,**
and Save TIME and MONEY!

CHAS. B. PECK,
GEN. FREIGHT & TICKET AGENT.

M. R. BALDWIN,
SUPERINTENDENT.

MOORE Steel Elastic Car Wheel Co. OF NEW JERSEY.

Proprietors of

MOORE'S PATENT
FOR THE MANUFACTURE OF

ELASTIC CAR WHEELS,

FOR PASSENGER AND SLEEPING COACHES.

Noiseless, Safe, Durable and Economical.

Also, Manufacturers of

CAR WHEELS OF EVERY DESCRIPTION.

H. W. MOORE, President.
JAS. K. FROTHINGHAM, Secretary.
F. W. BLOODGOOD, Treasurer.

Works, cor. Green and Wayne Sts., JERSEY CITY, N. J.
P. O. Address Box 129, Jersey City, N. J.

American Compound Telegraph Wire.

More than 3000 Miles now in Operation.

Demonstrating beyond question its superior working capacity, and great ability to withstand the elements. For RAILROAD LINES, connecting a single wire with a large number of Stations, and for long circuits, this wire is peculiarly adapted; the large conducting capacity secured by the copper, with other advantages, rendering such lines fully serviceable during the heaviest rains.

Having a core of steel, a small number of poles only are required, as compared with iron wire construction, thereby preventing much loss of the current from leakage and very materially reducing cost of maintenance. OFFICE AMERICAN COMPOUND TELEGRAPH WIRE CO.
284 West 29th Street, New York.

BLISS, TILLOTSON & CO., Western Agents,
247 South Water Street, Chicago.



OMNIBUSES

—OF—

EVERY STYLE!

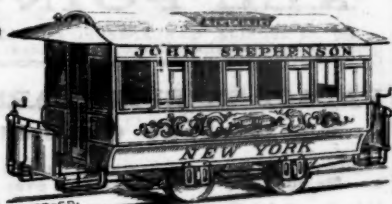
Orders Promptly Filled.

CARS,

LIGHT, STRONG!

—AND—

ELEGANT!



CHICAGO, ROCK ISLAND & PACIFIC RAILROAD.

THE DIRECT ROUTE FOR

JOLIET, MORRIS, OTTAWA, LASALLE, PERU, HENRY, PEORIA,
Lacon, Geneseo, Moline,

ROCK ISLAND, DAVENPORT,
Muscatine, Washington, Iowa City,

GRINNELL, NEWTON, DES MOINES,

COUNCIL BLUFFS & OMAHA!

CONNECTING WITH TRAINS ON THE UNION PACIFIC RAILROAD, FOR

Cheyenne, Denver, Central City, Ogden, Salt Lake,
White Pine, Helena, Sacramento, San Francisco,

And Points in Upper and Lower California; and with Ocean Steamers at San Francisco, for all Points in
China, Japan, Sandwich Islands, Oregon and Alaska.

TRAINS LEAVE their Splendid new Depot, on VanBuren Street, Chicago, as follows:

LEAVE	ARRIVE
PACIFIC EXPRESS , (Sunday excepted).....	10.00 a. m. 4.15 p. m.
PERU ACCOMMODATION , (Sundays excepted).....	4.30 p. m. 9.45 a. m.
PACIFIC EXPRESS , (Saturdays excepted),.....	10.00 p. m. [Mon. ex. 7.00 a. m.]

ELEGANT PALACE SLEEPING COACHES!

Run Through to Peoria and Council Bluffs, Without Change.

Connections at LA SALLE, with Illinois Central Railroad, North and South; at PEORIA, with Peoria, Pekin & Jacksonville Railroad, for Pekin, Virginia, &c.; at PORT BYRON JUNCTION, for Hampton, LeClaire, and Port Byron; at ROCK ISLAND, with Packets North and South on the Mississippi River.

For Through Tickets, and all desired information in regard to Rates, Routes, etc., call at the Company's Office, No. 37 South Clark Street, Chicago, or 257 Broadway, New York.

A. M. SMITH, Gen. Pass. Agent. **HUGH BIDDLE, Gen. Supt.** **P. A. HALL, Asst. Gen. Supt.**

KANSAS PACIFIC RAILWAY.

Great Smoky Hill Route

THROUGH KANSAS TO DENVER, COLORADO.

Connecting with the DENVER PACIFIC R. R. for CHEYENNE; forming, in connection with the UNION and CENTRAL PACIFIC R. R.'s, a NEW ALL-RAIL ROUTE to

Colorado, Wyoming, Utah, Montana,
NEVADA, CALIFORNIA,

AND THE PACIFIC COAST.

THE ONLY ROUTE RUNNING PULLMAN DRAWING-ROOM & SLEEPING CARS THROUGH TO DENVER.

No Omnibus or Ferry Transfer!

Direct Connections made in UNION DEPOTS at Kansas City [State Line] with the Hannibal & St. Joseph, North Missouri and Missouri Pacific Railroads.

Daily Trains leave Kansas City, State Line and Leavenworth, for Lawrence, Topeka, Emporia, Humboldt, New Chicago, Chetopa, Junction City, Abilene, Salina, Brookville, Ellsworth, Hays, KIT CARSON, DENVER, GREELEY, CHEYENNE, OGDEN, SALT LAKE CITY, CORINNE.

Sacramento & San Francisco.

Connect at Kit Carson with Southern Overland Passenger and Mail Coaches for PUEBLO, TRINIDAD, SANTA FE, and all principal points in

Old and New Mexico and Arizona.

Connect at DENVER with the Colorado Central Railroad and Fast Concord Coaches, for Golden City, Black Hawk, Central City, Idaho City, Georgetown and Fair Play.

Passenger and Freight Rates as low and conveniences as ample as by any Route.

Ask for Tickets via **KANSAS PACIFIC RAILWAY**, which can be obtained at all principal ticket offices in the United States.

R. B. GEMMELL, Gen. Ticket Agt. **T. F. OAKES, Gen. Freight Agt.** **A. ANDERSON, Gen. Supt.**
Lawrence, Kansas. Kansas City, Mo. Lawrence, Kan.

FARMS AND HOMES IN KANSAS.

Five Million Acres of Choice Farming Lands, situated along the line of this Great National Route, at from one to six dollars per acre. For full particulars, apply to
JNO. P. DEVEREUX, Land Commissioner, Lawrence, Kan.

THE ERIE & PACIFIC DISPATCH CO.

Are Authorized Freight Agents.

For information, Contracts, and Bills of Lading, apply at their office, 64 Clark Street, Chicago.

H. H. RAPP, AGT.

Western Union Railroad.

CHICAGO & NORTHWESTERN DEPOT, CHICAGO. MILWAUKEE & CHICAGO DEPOT, MILWAUKEE.

THE DIRECT ROUTE! CHICAGO, RACINE & MILWAUKEE,

—TO—

Beloit, Savanna, Clinton, Pt. Byron, Davenport, Mineral Point,
Madison, Freeport, Fulton, Lyons, Rock Island, Sabula,
Galena, Dubuque, Des Moines, Council Bluffs,

OMAHA, SAN FRANCISCO

AND ALL PRINCIPAL POINTS IN

Southern and Central Wisconsin, Northern Illinois, and Central and Northern Iowa.

FRED. WILD,
Gen. Ticket Agent.

D. A. OLIN,
Gen. Superintendent.

THE FAVORITE THROUGH PASSENGER ROUTE!

Chicago, Burlington & Quincy RAILROAD LINE.

3 THROUGH EXPRESS TRAINS DAILY!

FROM CHICAGO	Hours.	1st Class Fare.	FROM CHICAGO	Days.	1st Class Fare.
TO OMAHA, - - -	23	\$20.00	TO DENVER, - - -	2½	\$63.00
" ST. JOSEPH, - - -	21	19.50	" SACRAMENTO, - - -	4½	118.00
" KANSAS CITY, - - -	22	20.00	" SAN FRANCISCO, - - -	5	118.00

TRAINS LEAVE CHICAGO from the Great Central Depot, foot of Lake Street, as follows:

BURLINGTON, KEOKUK, COUNCIL BLUFFS & OMAHA LINE

7:40 A. M. MAIL AND EXPRESS. (Except Sunday.) stopping at all stations; making close connections at Mendota with Illinois Central for Amboy, Dixon, Freeport, Galena, Dunleith, Dubuque, LaSalle, El Paso, Bloomington, &c.

10:45 A. M. PACIFIC FAST LINE. (Except Sunday.) stopping at Riverside, Hinsdale, Aurora, Leland, Mendota, Princeton, Buda, Kewanee, Galva, Galesburg, and all stations West and South of Galesburg.

ELEGANT DAY COACHES and **PULLMAN PALACE DRAWING ROOM CARS** are attached to this train daily from Chicago.

TO COUNCIL BLUFFS & OMAHA WITHOUT CHANGE!

9:00 P. M. PACIFIC NIGHT EXPRESS. (Daily, except Saturday.) for Burlington, Ottumwa, Des Moines, Nebraska City, Council Bluffs, Omaha, and all points West. Pullman Drawing Room Sleeping Car attached to this train daily from Chicago to Burlington, and Elegant Day Coaches, from Chicago to Council Bluffs and Omaha, without change! This is the Route between

CHICAGO, COUNCIL BLUFFS & OMAHA,

—RUNNING THE CELEBRATED—

Pullman Palace Dining Cars!

49 MILES THE SHORTEST ROUTE BETWEEN

Chicago & Keokuk,

And the Only Route Without Ferrying the Mississippi River!

QUINCY, ST. JOSEPH, LEAVENWORTH & KANSAS CITY LINE.

7:40 A. M. MAIL AND EXPRESS (Except Sunday.) stopping at all stations between Chicago and Galesburg; making close connections at Mendota with Illinois Central for Amboy, Dixon, Freeport, Dunleith, Dubuque, LaSalle, El Paso, Bloomington, &c.

10:45 A. M. PACIFIC EXPRESS. (Daily, except Sunday.) with SLEEPING CARS attached, running through from Chicago to KANSAS CITY, **Without Change!**

9:00 P. M. PACIFIC NIGHT EXPRESS. (Daily.) with Pullman Palace Drawing Room Sleeping Car attached running through from Chicago to QUINCY.

Kansas City, Lawrence, Topeka and Denver,

WITHOUT CHANGE!

64 MILES THE SHORTEST AND ONLY ROUTE BETWEEN

Chicago and Kansas City!

WITHOUT CHANGE OF CARS OR FERRY.

115 MILES The Shortest Route bet. Chicago & St. Joseph.

THE SHORTEST, BEST AND QUICKEST ROUTE BETWEEN CHICAGO AND

Atchison, Weston, Leavenworth, Lawrence,

AND ALL POINTS ON THE KANSAS PACIFIC R.R.

Local Trains Leave **RIVERSIDE & HINSDALE ACCOMMODATION** 7:00 A. M. 1:30 & 6:15 P. M.
GALESBURG PASSENGER 3:00 P. M.
MENDOTA PASSENGER 4:15 P. M.
AURORA PASSENGER 5:30 P. M.

Ask for Tickets via Chicago, Burlington & Quincy Railroad, which can be obtained at all principal offices of connecting roads, at Company's office, 63 Clark Street, and at Great Central Depot, Chicago at as low rates as by any other route.

ROB'T HARRIS, Gen'l Superintendent, CHICAGO.
SAM'L POWELL, Gen'l Ticket Agent, CHICAGO.
E. A. PARKER, Gen. West. Pass. Agt., CHICAGO.

THE GREAT THROUGH PASSENGER ROUTE TO KANSAS

IS VIA THE OLD RELIABLE

HANNIBAL & ST. JOSEPH SHORT LINE.

Crossing the Mississippi at Quincy and the Missouri at Kansas City on New Iron Bridges; running Three Daily Express Trains, Through Cars and Pullman Sleeping Palaces from Chicago & Quincy to St. Joseph & Kansas City.

The Advantages gained by this Line over any other Route from Chicago, are:

115 MILES THE SHORTEST!

To St. Joseph, Atchison, Hiawatha, Waterville, Weston, Leavenworth,

64 MILES THE SHORTEST!

To Kansas City, Fort Scott, Lawrence, Ottawa,

Garnett, Iola, Humboldt, Topeka, Burlingame, Emporia, Manhattan, Fort Riley, Junction City, Salina, Ellsworth, Hays, Sheridan, Olathe, Paola, Cherokee Neutral Lands, Baxter Springs, Santa Fe, New Mexico, and all points on the KANSAS PACIFIC, and MISSOURI RIVER, FT. SCOTT & GULF R.R.'s, with which we connect at Kansas City Union Depot.

THIS BEING THE SHORTEST LINE AND QUICKEST, is consequently the cheapest; and no one that is posted thinks of taking any other Route from Chicago to reach principal points in

Missouri, Kansas, Indian Territory, or New Mexico.

DAILY OVERLAND STAGES from west end Kansas Pacific Railway, for Pueblo, Santa Fe, Denver, and points in Colorado and New Mexico.

This is also a most desirable Route, via St. Joseph, to Brownsville, Nebraska City, Council Bluffs, and Omaha, connecting with the Union Pacific Railroad for Cheyenne, Denver, Salt Lake, Sacramento, San Francisco, and the Pacific coast.

Through Tickets for Sale at all Ticket Offices. Baggage Checked Through, and Omnibus Transfers and Portage avoided.

P. B. GROAT, Gen. Ticket Agent, HANNIBAL, MO.
GEO. H. NETTLETON, Gen. Supt., HANNIBAL, MO.

Old, Reliable, Air-Line Route!

CHICAGO, ALTON & ST. LOUIS R. R.

SHORTEST, QUICKEST AND ONLY DIRECT ROAD TO

Bloomington, Springfield, Jacksonville, Alton,

—AND—

ST. LOUIS!

WITHOUT CHANGE OF CARS.

THE ONLY ROAD MAKING IMMEDIATE CONNECTIONS AT ST. LOUIS WITH MORNING AND EVENING TRAINS

—FOR—

ATCHISON, LEAVENWORTH, KANSAS CITY,

Lawrence, Topeka, Memphis, New Orleans,

And All Points South and Southwest.

TRAINS leave Chicago from the West-side Union Depot, near Madison Street Bridge.

	Depart.	Arrive.
EXPRESS MAIL	*9:15 A. M.	*8:05 P. M.
JOLIET ACCOMMODATION	*4:00 P. M.	*9:40 A. M.
NIGHT EXPRESS	*5:30 "	*12:50 P. M.
LIGHTNING EXPRESS	*9:00 "	*7:30 A. M.

*Sundays excepted.

†Daily; Saturdays it runs to Bloomington only.

‡Saturdays and Sundays excepted. Monday mornings this train runs from Bloomington to St. Louis.

This is the ONLY LINE Between CHICAGO & ST. LOUIS RUNNING

Pullman's Palace Sleeping and Celebrated Dining Cars!

BAGGAGE CHECKED THROUGH.

Through Tickets can be had at the Company's office, No. 55 Dearborn street, Chicago, or at the Depot, corner of West Madison and Canal streets, and at all principal Ticket Offices in the United States and Canada. Rates of Fare and Freight as low as by any other Route.

A. NEWMAN, Gen. Pass. Agent.**J. C. McMULLIN,** Gen. Supt.

North Missouri R. R.

PASSENGERS FOR

KANSAS AND THE WEST,

ARE REMINDED THAT

THE NORTH MISSOURI R. R.

—IS—

11 MILES SHORTER than any other Route!

BETWEEN

St. Louis and Kansas City.

15 Miles Shorter between ST. LOUIS and LEAVENWORTH

—AND—

50 MILES SHORTER TO ST. JOSEPH!

THAN ANY OTHER LINE OUT OF ST. LOUIS.

Three Through Express Trains Daily!

Pullman's Celebrated Palace Sleeping Cars on all Night Trains!

FOR TICKETS, apply at all Railroad Ticket Offices, and see that you get your Tickets via St. Louis and North Missouri Railroad.

JAMES CHARLTON,
Gen. Pass. and Ticket Agent, St. Louis.

W. R. ARTHUR,
General Superintendent, St. Louis.

Pacific Railroad of Missouri.

THE MOST DIRECT AND RELIABLE ROUTE FROM ST. LOUIS THROUGH TO

KANSAS CITY, LEAVENWORTH & ATCHISON,

WITHOUT CHANGE OF CARS!

Close Connections at KANSAS CITY with Missouri Valley, Missouri River, Ft. Scott & Gulf, and Kansas Pacific R.R.'s, for Weston, St. Joseph, Junction City, Fort Scott, Lawrence, Topeka, Sheridan, Denver, Fort Union, Santa Fe, and

ALL POINTS WEST!

At SEDALIA, WARRENSBURG and PLEASANT HILL, with Stage Lines for Warsaw, Quincy, Bolivar, Springfield, Clinton, Osceola, Lamar, Carthage, Granby, Neosho, Baxter Springs, Fort Gibson, Fort Smith, Van Buren, Fayetteville, Bentonville.

PALACE SLEEPING CARS on all NIGHT TRAINS.

Baggage Checked Through Free!

THROUGH TICKETS for sale at all the Principal Railroad Offices in the United States and Canada. Be Sure and Get your Tickets over the PACIFIC R. R. OF MISSOURI.

W. B. HALE,
Gen. Pass. and Ticket Agt.

THOS. McKISSOCK,
General Superintendent.

ILLINOIS CENTRAL RAILROAD.

PASSENGER TRAINS LEAVE CHICAGO FROM THE GREAT CENTRAL DEPOT, FOOT OF LAKE ST.

ST. LOUIS AND CHICAGO THROUGH LINE.

No Change of Cars from Chicago to St. Louis.

9:20 A. M. DAY EXPRESS Sundays Ex. Arriving in ST. LOUIS at 10:30 P. M.

8:15 P. M. FAST LINE. Saturdays Excepted. Arriving at ST. LOUIS at 8:00 A. M.

AT ST. LOUIS, Direct Connections are Made FOR

Jefferson City, Sedalia, Pleasant Hill, Macon, Kansas City, LEAVENWORTH, ST. JOSEPH & ATCHISON,

—Connecting at KANSAS CITY for—

LAWRENCE, TOPEKA, JUNCTION CITY, SALINA, SHERIDAN, Denver and San Francisco!

CAIRO, MEMPHIS AND NEW ORLEANS LINE.

No Change of Cars from Chicago to Cairo.

9:20 A. M. CAIRO MAIL, Sundays Excepted. Arriving at Cairo 2:5 A. M., Memphis 12:45 P. M., Mobile 9:25 A. M. Vicksburg 9:25 A. M., New Orleans 11:05 A. M.

8:15 P. M. CAIRO EXPRESS, Except Saturdays. Arriving at Cairo 12:24 P. M., Memphis 4:15 A. M., Little Rock 7:00 P. M., Vicksburg 8:10 P. M., New Orleans 1:30 A. M.

4:50 P. M. CHAMPAIGN PASSENGER, Arriving at Champaign at 10:45 P. M.

THIS IS THE ONLY DIRECT ROUTE TO

Humboldt, Corinth, Grand Junction, Little Rock, Hot Springs, Selma, Canton, Grenada, Columbus, Meridian, Enterprise,

MEMPHIS, VICKSBURG, NEW ORLEANS & MOBILE.

At NEW ORLEANS, connections are made for

GALVESTON, INDIANOLA,

And all Parts of Texas.

NOTICE.—This Route is from 100 to 150 MILES SHORTER, and from 12 to 24 HOURS QUICKER than any other.

THIS IS ALSO THE ONLY DIRECT ROUTE TO

DECATUR, TERRE HAUTE, VINCENNES & EVANSVILLE.

Peoria and Keokuk Line.

9:20 A. M. KEOKUK PASSENGER, Sun. Excepted. Arriving at Chenoa 3:30 P. M., El Paso 4:08 P. M., Peoria 5:42 P. M., Canton 7:15 P. M., Bushnell 8:57 P. M., Keokuk 11:15 P. M., Warsaw 11:40 A. M.

Elegant Drawing Room Sleeping Cars ATTACHED TO ALL NIGHT TRAINS.

Spacious and Fine Saloon Cars! WITH ALL MODERN IMPROVEMENTS, RUN UPON ALL TRAINS.

BAGGAGE CHECKED THROUGH TO ALL IMPORTANT POINTS.

For Through Tickets, Sleeping Car Berths, Baggage Checks, and Information, apply at the office of the Company in the Great Central Depot, foot of Lake St.

Hyde Park and Oakwoods Train.

HYDE PARK TRAIN... LEAVE... 7:45 A. M.	ARRIVE... 7:45 A. M.	HYDE PARK TRAIN... LEAVE... 8:00 P. M.	ARRIVE... 8:15 P. M.
HYDE PARK TR. IN... 8:00 A. M.	8:30 A. M.	HYDE PARK TRAIN... 8:10 P. M.	8:35 P. M.
HYDE PARK TRAIN... 12:10 P. M.	12:45 P. M.		

* Sundays Excepted.

W. P. JOHNSON, Gen. Pass. Agent.

M. HUGHITT, Gen. Supt.

CHICAGO & NORTHWESTERN R. W.

Comprising the PRINCIPAL RAILROADS from CHICAGO Directly NORTH NORTH-WEST and WEST.

ALL RAIL TO THE PACIFIC OCEAN!

Great California Line.

TRAINS LEAVE WELLS STREET DEPOT AS FOLLOWS:

8:30 A. M. Clinton Passenger.	10:00 P. M. Night Mail.
10:45 A. M. Pacific Express.	10:00 P. M. Rock Island Pass.
10:45 A. M. Rock Island Exp.	4:00 P. M. Dixon Passenger.

For Sterling, Rock Island, Fulton, Clinton, Cedar Rapids, Boone, Denison, Missouri Valley Junction, Sioux City, Council Bluffs and Omaha, there connecting with the

UNION PACIFIC R. R.

For Cheyenne, Denver, Ogden, Salt Lake, the White Pine Silver Mines, Sacramento, San Francisco, and all parts of Nebraska, Colorado, New Mexico, Arizona, Wyoming, Montana, Idaho, Utah, Nevada, and the PACIFIC COAST.

FROM CHICAGO	Hours.	1st Class Fare.	FROM CHICAGO	Days.	1st Class Fare.
To OMAHA.....	23	\$20.00	To SACRAMENTO..	4 1/2	\$118.00
" DENVER.....	52	65.00	" SAN FRANCISCO,	5	118.00

TRAINS ARRIVE:—Night Mail, 7:15 a. m.; Dixon Passenger, 11:10 a. m.; Pacific Express 4:15 p. m.; Rock Island Express, 4:15 p. m.; Clinton Passenger, 6:45 p. m.

FREEPORT LINE.

9.00 A. M. & 9.00 P. M. For Belvidere, Rockford, Freeport, Galena, Dunleith, and St. Paul.

4.00 P. M., Rockford Accommodation.
5.30 P. M., Geneva and Elgin Accommodation
6.10 P. M., Lombard Accommodation.
5.50 P. M., Junction Passenger.

TRAINS ARRIVE:—Freeport Passenger, 2:30 p. m.; 6:40 a. m.; Rockford Accommodation, 11:10 a. m.; Geneva and Elgin Accommodation, 8:45 a. m.; Junction Passenger, 8:10 a. m.; Lombard Accommodation, 6:50 a. m.

WISCONSIN DIVISION.

Trains leave Depot, cor. West Water and Kinzie Sts., daily, Sundays excepted, as follows:
10.00 A. M. DAY EXPRESS, for Janesville, Monroe, Whitewater, Madison, Prairie du Rocher, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Neenah, Appleton, and Green Bay.

3.00 P. M., Janesville Accommodation.
5.00 P. M. NIGHT EXPRESS, for Madison, Prairie du Rocher, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Menasha, Appleton, Green Bay, and THE LAKE SUPERIOR COUNTRY.

5.30 P. M., Woodstock Accommodation.
TRAINS ARRIVE:—7:00 a. m., 7:15 p. m., 9:00 a. m., and 2:05 p. m.

MILWAUKEE DIVISION.

MILWAUKEE MAIL, (ex. Sun.) Waukegan, Kenosha, Racine and Milwaukee..... 8:15 A. M.
EXPRESS, (ex. Sun.) Waukegan, Kenosha, Racine and Milwaukee..... 9:45 A. M.
EVANSTON ACCOMMODATION..... 1:00 P. M.
HIGHLAND PARK PASSENGER..... 6:20 P. M.
MILWAUKEE ACCOMMODATION, with Sleeping Car attached..... 11:00 P. M.
KENOSHA ACCOMMODATION, (Sundays excepted) from Wells St. Depot..... 4:10 P. M.
AFTERNOON PASSENGER..... 5:00 P. M.
WAUKEGAN ACCOMMODATION, (except Sundays) from Wells St. Depot..... 5:30 P. M.
TRAINS ARRIVE:—Night Accommodation, with Sleeping Car, 5:00 a. m.; Day Express, 4:15 p. m.; Milwaukee Mail, 10:30 a. m.; Afternoon Passenger, 7:40 p. m.; Waukegan Accommodation, 8:25 a. m.; Kenosha Accommodation, 9:10 a. m.; Evanston Accommodation, 3:30 p. m.; Highland Park Passenger, 7:55 p. m.

PULLMAN PALACE CARS ON ALL NIGHT TRAINS.

THROUGH TICKETS Can be purchased at all principal Railroad Offices East and South, and in Chicago at the Southeast corner of Lake and Clark Streets, and at the Passenger Stations as above.

H. P. STANWOOD, Gen. Ticket Agt.

JOHN C. GAULT, Gen'l Supt.

Milwaukee & St. Paul R. W.

THE ONLY ALL RAIL LINE TO

ST. PAUL AND MINNEAPOLIS!

AND ALL PORTIONS OF

Wisconsin, Minnesota & Northern Iowa.

PURCHASE TICKETS VIA MILWAUKEE.

Passengers Going via Milwaukee,

Have Choice of Seats in Clean Coaches, and on Night Trains, a full night's rest in Palace Sleeping Cars.

BAGGAGE CHECKED THROUGH BY THIS ROUTE ONLY!

PASSENGERS FROM CHICAGO can obtain these Advantages only by the MILWAUKEE DIVISION of the CHICAGO & NORTHWESTERN R.W.

SPECIAL NOTICE.—Passengers destined to any place in Wisconsin, Minnesota, or Northern Iowa, either on or off the Lines of this Company, who cannot procure Through Tickets to their destination, should purchase their Tickets TO MILWAUKEE, as this is the Great Distributing Point for these States.

A. V. H. CARPENTER, Gen. Pass. Agt. Milwaukee.

S. S. MERRILL, Gen. Manager, Milwaukee.

61 Miles the Shortest Line!

— FROM —

CHICAGO TO NEW YORK.

Pitts., Ft. Wayne & Chicago

— AND —

PENNSYLVANIA CENTRAL

IS THE ONLY ROUTE

Running its Entire Trains THROUGH to Philadelphia and New York, and the only Route running Three Daily Lines of Pullman Day and Sleeping Palaces, from Chicago to

**PITTSBURGH, HARRISBURG,
PHILADELPHIA & NEW YORK,**

WITHOUT CHANGE!

WITH BUT ONE CHANGE TO

**BALTIMORE, PROVIDENCE, NEW HAVEN, HARTFORD,
SPRINGFIELD, WORCESTER & BOSTON!**

AND THE MOST DIRECT ROUTE TO WASHINGTON.

Trains Leave WEST SIDE UNION DEPOT, corner West Madison and Canal Streets, as follows:

	Mail.	Fast Express.	Pacific Exp.	Night Exp.
Leave—CHICAGO.....	5.30 A. M.	9.00 A. M.	5.15 P. M.	9.00 P. M.
Arrive—PLYMOUTH.....	9.50 "	12.03 P. M.	9.45 "	12.35 A. M.
" FORT WAYNE.....	12.30 P. M.	2.05 "	11.15 "	3.10 "
" LIMA.....	3.24 "	4.06 "	1.33 A. M.	5.40 "
" FOREST.....	4.43 "	5.08 "	2.45 "	7.07 "
" CRESTLINE.....	6.30 "	6.30 "	4.30 "	8.55 "
Leave—CRESTLINE.....	6.00 A. M.	6.50 "	4.30 "	8.35 "
Arrive—MANSFIELD.....	6.40 "	7.17 "	5.00 "	10.05 "
" ORRVILLE.....	9.15 "	9.05 "	6.54 "	11.55 "
" ALLIANCE.....	11.10 "	10.40 "	8.30 "	1.30 P. M.
" PITTSBURGH.....	3.45 P. M.	1.55 A. M.	12.10 P. M.	4.40 "
" CRESSON.....	11.57 "	5.44 "	4.48 "	10.00 "
" ALTOONA.....	12.43 A. M.	6.55 "	5.55 "	9.40 A. M.
" HARRISBURG.....	5.30 "	11.25 "	10.45 "	9.50 "
" PHILADELPHIA.....	6.50 "	3.15 "	3.00 "	6.50 "
" NEW YORK, VIA PHILADELPHIA.....	10.30 "	6.30 "	6.41 "	10.30 "
" NEW YORK, VIA ALLENTOWN.....	10.30 "	6.30 "	6.30 "	10.30 "
" BALTIMORE.....	9.15 P. M.	3.05 "	2.30 A. M.	9.15 P. M.
" WASHINGTON.....	1.00 "	5.15 "	5.45 "	1.00 "
" BOSTON.....	9.00 "	5.50 A. M.	6.00 "	9.00 "

Boston and New England Passengers will find this Route especially Desirable, as it gives them an opportunity of Seeing the FINEST VIEWS AMONG THE ALLEGHANY MOUNTAINS.

Besides Visiting PITTSBURGH, PHILADELPHIA and NEW YORK, without extra cost!

All New England Passengers holding Through Tickets will be Transferred, with their Baggage, to Rail and Boat Connections in NEW YORK, Without Charge!

THROUGH TICKETS for sale at the Company's Offices, at 65 Clark St.; 52 Clark St.; cor. Randolph and LaSalle Sts.; and at Depot, Chicago. Also at Principal Ticket Offices in the West.

CLOSE CONNECTIONS Made at LIMA for all Points on the Dayton & Michigan and the Cincinnati, Hamilton & Dayton Railways, and at CRESTLINE for Cleveland and Columbus.

Express Trains are Equipped with WESTINGHOUSE AIR BRAKES,
The Most Perfect Protection Against Accidents in the World!

F. R. MYERS, Gen. Pass. & Tkt. Agt. P. F. W. & C. R'y Chicago. | **W. C. CLELAND,** Gen. Western Pass. Agt. P. F. W. & C. R'y, Chicago.
T. L. KIMBALL, Gen. Western Pass. Agt. Penn. Cen. R. R. Chicago.

Broad Gauge! Double Track!

ERIE RAILWAY.

4 EXPRESS TRAINS DAILY!
From Cleveland, Dunkirk and Buffalo, 625 Miles, to New York, WITHOUT CHANGE of Coaches!

The Trains of this Railway are run in DIRECT CONNECTION WITH ALL WESTERN AND SOUTHERN LINES, for

Elmira, Williamsport, Oswego, Great Bend, Scranton, Newburgh,
NEW YORK, ALBANY, BOSTON, PROVIDENCE,
AND PRINCIPAL NEW ENGLAND CITIES.

New and Improved DRAWING ROOM COACHES are attached to the DAY EXPRESS Running THROUGH TO NEW YORK.

SLEEPING COACHES, Combining all Modern Improvements, with perfect Ventilation and the peculiar arrangements for the comfort of Passengers incident to the BROAD GAUGE, accompany all night trains to New York.

CONNECTIONS CERTAIN! as Trains on this Railway will, when necessary, wait from one to two hours for Western trains.

All Trains of Saturday run directly Through to New York.

Ask for Tickets via Erie Railway, which can be procured at 66 Clark Street, Chicago, and at all Principal Ticket offices in the West and Southwest.

L. D. RUCKER, Gen'l Superintendent New York. | **A. J. DAY,** Western Passenger Agent, Chicago. | **WM. R. BARR,** Gen'l Passenger Agent, New York.

Pan-Handle

— AND —

Penn'a Central Route East!

SHORTEST AND QUICKEST ROUTE, VIA COLUMBUS, TO
PITTSBURGH, BALTIMORE, PHILADELPHIA & NEW YORK

On and after Sunday, NOVEMBER 24th, 1870, Trains for the East will run as follows:

[DEPOT CORNER CANAL AND KINZIE STS., WEST SIDE.]

7:40 A. M. DAY EXPRESS.
[SUNDAYS EXCEPTED.] Via Richmond. Arriving at

COLUMBUS... 8:00 A. M. | HARRISBURG... 10:35 P. M. | NEW YORK... 6:40 A. M. | WASHINGTON... 5:45 A. M.
PITTSBURGH... 12:15 M. | PHILADELPHIA 8:10 A. M. | BALTIMORE... 2:30 A. M. | BOSTON... 6:05 P. M.

7:10 P. M. NIGHT EXPRESS.
[SUNDAYS EXCEPTED.] Arriving at:

COLUMBUS... 11:15 A. M. | HARRISBURG... 5:30 A. M. | NEW YORK... 11:40 A. M. | WASHINGTON... 1:10 P. M.
PITTSBURGH... 7:35 P. M. | PHILADELPHIA 9:50 A. M. | BALTIMORE... 9:30 A. M. | BOSTON... 11:50 P. M.

Palace Day and Sleeping Cars

Run Through to COLUMBUS, and from Columbus to NEW YORK, WITHOUT CHANGE!

ONLY ONE CHANGE TO NEW YORK, PHILADELPHIA, OR BALTIMORE!

CINCINNATI & LOUISVILLE AIR LINE SOUTH.

35 Miles the Shortest Route to Cincinnati.

18 Miles the Shortest Route to Indianapolis and Louisville

3 Hours the Quickest Route to Cincinnati!

THE SHORTEST AND BEST ROUTE TO

Columbus, Chillicothe, Hamilton, Wheeling, Parkersburg, Evansville,
Dayton, Zanesville, Marietta, Lexington, Terre Haute, Nashville,

ALL POINTS IN CENTRAL & SOUTHERN OHIO, & INDIANA, KENTUCKY & VIRGINIA.

— QUICK, DIRECT AND ONLY ALL RAIL ROUTE TO —

New Orleans, Memphis, Mobile, Vicksburg, Charleston, Savannah,

AND ALL POINTS SOUTH.

Cincinnati, Indianapolis and Louisville Trains run as follows:

THROUGH WITHOUT CHANGE OF CARS!

7.40 A. M.	8.05 P. M.
(Sundays excepted) Arriving at	(Saturdays excepted) Arriving at
LOGANSPORT..... 1:15 P. M.	LOGANSPORT..... 1:15 A. M.
KOKOMO..... 2:33 P. M.	KOKOMO..... 2:31 A. M.
CINCINNATI..... 10:10 P. M.	CINCINNATI..... 9:35 A. M.
INDIANAPOLIS..... 6:00 P. M.	INDIANAPOLIS..... 5:40 A. M.
LOUISVILLE..... 11:30 P. M.	LOUISVILLE..... 5:50 P. M.

Lansing Accommodation: Leaves 3:40 P. M. Arrives 10:55 A. M.

PULLMAN'S PALACE SLEEPING CARS!

Accompany all Night Trains between Chicago and Cincinnati or Indianapolis.

Ask for Tickets via COLUMBUS for the East, and via "The AIR LINE" for Cincinnati, Indianapolis, Louisville and points South. Tickets for sale and Sleeping Car Berths secured at 95 RANDOLPH STREET, CHICAGO, and at Principal Ticket Offices in the West and Northwest.

WM. L. O'BRIEN,

Gen. Pass. and Ticket Agent, Columbus.

I. S. HODSDON

Northwestern Pass. Agt. Chicago.

D. W. CALDWELL Gen. Supt. Columbus.

The Great Favorite Route for Missouri, Nebraska and Iowa.

KANSAS CITY, ST. JOSEPH

— AND —

COUNCIL BLUFFS

THROUGH LINE!

3 EXPRESS PASSENGER TRAINS Leave Union Depot Daily, on the arrival of Eastern Southern and Western Trains, crossing the Missouri River on the New Iron Bridge at KANSAS CITY, passing the cities of

LEAVENWORTH, ATCHISON, SAINT JOSEPH,

— AND —

NEBRASKA CITY.

Connecting at COUNCIL BLUFFS with Iowa Lines for all prominent points in Iowa, and making DIRECT CONNECTION at OMAHA with the Great Union Pacific Railroad, for

CHEYENNE, DENVER, SALT LAKE, SACRAMENTO, SAN FRANCISCO

And the Pacific Coast.

Pullman's Palace Sleeping Cars!

ON ALL NIGHT TRAINS.

Ask for Tickets via the People's Favorite Route, Kansas City, St. Joseph & Council Bluffs Railroad Line.

A. L. HOPKINS,

Gen. Superintendent ST. JOSEPH, Mo.

A. C. DAWES,

Gen. Passenger Agent, ST. JOSEPH, Mo.

LAKE SHORE — AND — MICHIGAN SOUTHERN R.W.

THE GREAT THROUGH LINE BETWEEN
CHICAGO, BUFFALO & NEW YORK,
WITHOUT CHANGE!

AND THE ONLY RAILWAY
RUNNING PALACE COACHES THROUGH!
— BETWEEN —

CHICAGO & NEW YORK, via BUFFALO
WITHOUT TRANSFER OF PASSENGERS!

All Trains Stop at Twenty-Second Street to Take and Leave Passengers.
Baggage Checked at that Station for all Points East.

4 EXPRESS TRAINS DAILY, [Sundays Excepted,] Leave
CHICAGO from the New Depot, on Van Buren St., at the head of La Salle Street, as follow

5:30 A. M. MAIL TRAIN.
VIA OLD ROAD AND AIR LINE. SUNDAYS EXCEPTED.

Leaves 22d Street 7:45 A. M. Stops at all Stations. Arrives—Cleveland, 9:35 P. M.

9:00 A. M. SPECIAL NEW YORK EXPRESS,
VIA AIR LINE. SUNDAYS EXCEPTED.

Leaves—Twenty-Second Street, 9:15 A. M. Arrives—Elkhart, 12:45 P. M.; Cleveland 9:45 P. M.; Buffalo, 4:10 A. M.; New York, 7:00 P. M.; (Chicago Time) Boston, 11:45 P. M.

This Train has **PALACE SLEEPING COACH** Attached, Running
THROUGH TO ROCHESTER, WITHOUT CHANGE!

IN DIRECT CONNECTION WITH

Wagner's Celebrated Drawing-Room Coaches on N. Y. Central R. R.
Only Thirty-Three Hours, Chicago to New York!

5:15 P. M. ATLANTIC EXPRESS (Daily),
VIA OLD ROAD.

Leaves—Twenty-Second Street 5:30 P. M. Arrives—Laporte, 8:10 P. M. (Stops 20 minutes or Supper); arrives at Toledo, 3:50 A. M.; Cleveland, 7:35 A. M. (30 minutes for Breakfast); arrives at Buffalo, 1:50 P. M.; Rochester, 5:10 P. M. (30 minutes for Supper); connects with **Sleeping Coach** running Through from Rochester to Boston Without Change, making but One Change between Chicago and Boston.

NEW AND ELEGANT SLEEPING COACH Attached to this Train, Running
THROUGH FROM CHICAGO TO NEW YORK WITHOUT CHANGE! Arrives
at NEW YORK, 7:15 A. M.

9:00 P. M. NIGHT EXPRESS
VIA AIR LINE. (DAILY EXCEPT SAT. & SUN.)

Leaves—Twenty-Second Street, 9:15 P. M. Arrives—Toledo, 6:15 A. M. (30 minutes for Breakfast); arrives at Cleveland, 10:50 A. M.; Buffalo, 5:50 P. M.; New York, 12:00 M.; Boston, 3:50 P. M.

KALAMAZOO DIVISION.

Leave Chicago 9:00 A. M. Arrive at Kalamazoo 4:10 P. M.;
Grand Rapids, 7:10 P. M.

Leave Chicago 9:00 P. M. Arrive at Kalamazoo 7:25 A.
M.; Grand Rapids, 10:15 A. M.

There being no heavy grades to overcome, or mountains to cross, the road bed
and track being the smoothest and most perfect of any railway in the United States, this Company run
their trains at a high rate of speed with perfect safety.

Travelers who wish to SAVE TIME and make SURE CONNECTIONS,
purchase Tickets via

LAKE SHORE & MICHIGAN SOUTHERN R'Y.

THE ONLY LINE RUNNING THROUGH BETWEEN CHICAGO AND
BUFFALO, WITHOUT TRANSFER, and in Direct Connection with NEW YORK
CENTRAL RAILROAD and ERIE RAILWAY.

General Ticket Office for Chicago, No. 56 Clark Street.

CHAS. F. HATCH,
General Superintendent, CLEVELAND, OHIO

F. E. MORSE,
General Western Passenger Agent, CHICAGO.

GREAT CENTRAL ROUTE!

SPEED! COMFORT! SAFETY!

MICHIGAN CENTRAL

Great Western Railways.

THE FAVORITE ROUTE, VIA NIAGARA FALLS, TO

NEW YORK, BOSTON,
AND ALL EASTERN POINTS.

Pullman's Drawing-Room Cars
FROM CHICAGO TO NEW YORK WITHOUT CHANGE.

CELEBRATED HOTEL CARS FROM CHICAGO TO ROCHESTER.

Passenger Trains leave Chicago from Depot, foot of Lake Street, as follows: (All Trains
Stop at Twenty-Second Street Station to receive and leave Passengers.)

5:40 A. M. MAIL TRAIN, Sundays Excepted.
Has a car attached from Chicago going over both Main Line and Air Line
Division, Without Change. Connect at New Buffalo for St. Joseph; at Kalamazoo for Grand Rapids, Muskegon and Whitehall; at Jackson for Lansing, Saginaw and Bay City.

9:00 A. M. NEW YORK EXPRESS.
(SUNDAYS EXCEPTED.) Arrives at Michigan City at 11:10 A. M.; Niles, 12:20 P. M. (Dinner); Kalamazoo, 3:10 P. M.; Marshall, 3:24 P. M.; Jackson, 4:30 P. M.; Detroit, 6:55 P. M. (Supper); London, 11:25 A. M.; Hamilton, 2:35 A. M.; Niagara Falls, 4:4 A. M.; Rochester, 7:10 A. M. (Breakfast); Albany, 2:00 P. M.; NEW YORK, 7:00 P. M.; Springfield, 7:40 P. M.; BOSTON, 11:45 P. M. This Train connects at ROCHESTER with

WAGNER'S DRAWING-ROOM CAR THROUGH

To New York City Without Change!

9:30 A. M. CINCINNATI & LOUISVILLE EXPRESS
(SUNDAYS EXCEPTED.) Through Cars to Indianapolis and
Cincinnati without Change.

4:10 P. M. Kalamazoo, St. Joseph and Three Rivers Accom.
(SUNDAYS EXCEPTED.) Arrives at New Buffalo at 7:05 P. M.; St. Joseph, 8:40 P. M.; Kalamazoo, 1:05 P. M.; Three Rivers, 10:00 P. M.

5:15 P. M. ATLANTIC EXPRESS.
Leaves Daily. Arrives at Michigan City at 7:18 P. M.; Niles, 8:30 P. M. (Supper); Kalamazoo, 10:40 P. M.; Jackson, 1:10 A. M.; Detroit, 3:45 A. M.; London, 8:35 A. M. (Breakfast); Hamilton, 11:40 A. M.; Niagara Falls, 1:20 P. M.; Buffalo, 3:20 P. M.; Rochester, 5:10 P. M.; Albany, 1:30 A. M.; NEW YORK, 6:40 A. M.; Springfield, 6:40 A. M.; BOSTON 11:00 A. M. A MAGNIFICENT

PULLMAN DRAWING-ROOM SLEEPING CAR

IS ATTACHED TO THIS TRAIN DAILY, FROM

CHICAGO TO NEW YORK CITY.

The Celebrated **HOTEL CAR** is also Attached to this Train from
CHICAGO TO ROCHESTER.

SPECIAL NOTICE.—Boston and New England Passengers will please notice that this
Train now makes a direct connection through. A **Sleeping Car** is attached at Rochester at 5:30
P. M., running through to Springfield, Mass., thus avoiding transfer at Albany. Breakfast at Springfield.
This Train reaches Springfield early enough second morning to CONNECT WITH ALL TRAINS
up and down the Connecticut

6:05 P. M. CINCINNATI & LOUISVILLE EXPRESS
(SATURDAYS EXCEPTED.) Through Sleeping Cars to Louisville without Change.

This is the Only Line Running Sleeping Cars to Louisville!

9:00 P. M. NIGHT EXPRESS. Saturdays and Sundays Excepted.
Arrives at Michigan City at 11:03 P. M.; Niles, 12:25 A. M.; Kalamazoo, 2:00; Marshall, 3:12; Jackson, 4:25; Grand Trunk Junction, 7:00; Detroit, 7:45; London, 1:45 P. M.; Hamilton, 4:35; Toronto, 9:35; Niagara Falls, 5:40; Buffalo, 7:15 P. M.; Rochester, 9:10; Syracuse, 12:25 A. M.; Rome, 1:55; Utica, 2:25; Albany, 6:30 A. M.; NEW YORK, 12:00 M.; BOSTON, 3:30 P. M.

A PULLMAN PALACE SLEEPING CAR

Is attached to this Train for **DETROIT.** This Train connects at **DETROIT JUNCTION** with
Grand Trunk Railway for

MONTREAL, OGDENSBURG, &c.

9:00 P. M. Grand Rapids Express.
(SATURDAYS AND SUNDAYS EXCEPTED.) Arrives at Grand Rapids at
9:50 A. M.

An Elegant Pullman Sleeping Car

IS ATTACHED TO THIS TRAIN

THROUGH TO GRAND RAPIDS WITHOUT CHANGE!

Connecting there Direct to **MUSKEGON, WHITEHALL, &c., &c.,**

SPECIAL NOTICE.—The GREAT WESTERN RAILWAY of Canada
have during the past summer, put down 140 miles of New Rail, (a large proportion of the same being
Steel Rails,) and otherwise improved their track, so that it can be truly said that it is in as good condition
as any Line in the country.

Through Tickets (and secured accommodations in Drawing-Room Sleeping Cars) can be
purchased in Chicago at 60 Clark street (under Sherman House); at 48 Clark street (Grand Trunk
Railway); at 53 Clark street (N. Y. C. R. R.); at office under Briggs House; at Great Central Depot,
and at

General Office in Tremont House Block.

H. E. SARGENT,
Gen. Sup't M. C. R. R.

W. K. MUIR,
Gen. Sup't Gt. W. Ry.

HENRY C. WENTWORTH,
Gen. West. Pass. Agt. M. C. & Gt. W. Ry.

NOTICES OF THE PRESS.

"Of great interest to railroad men."—[Delaware (O.) Gazette].

"Valuable because of its reliability."—[Holmesburg (Pa.) Gazette].

"A valuable encyclopedia of railway topics."—[The Stockholder].

"The best journal of the class published."—[Philadelphia Herald].

"An excellent journal for railroad men."—[Mankato (Minn.) Record].

"The best paper of the kind now extant."—[Official Railway News].

"Promising much for the future."—[Detroit Commercial Advertiser].

"A model of what a railroad newspaper should be."—[Chicago Tribune].

"The best journal of the class in the United States."—[LaCrosse Leader].

"We regard it as the best railroad paper out."—[Peoria National Democrat].

"Every railroad man reads the GAZETTE."—[Bloomington (Ill.) Leader].

"A complete repository of railroad news."—[Harrisburg (Pa.) Patriot].

"Equal in appearance to any technical journal of America."—[Atchison Patriot].

"The best medium for railroad information published."—[Kankakee (Ill.) Times].

"Replete with matters connected with railroad."—[Holmesburg (Pa.) Gazette].

"Well worthy the patronage of all intelligent railroad men."—[Kalamazoo Gazette].

"A well-edited paper, showing industry and intelligence."—[American Railway Times].

"The best informed railway newspaper published in the West."—[Aurora (Ill.) Beacon].

"Unquestionably the best railroad journal in the United States."—[Waukegan (Ill.) Patriot].

"Standing in the front ranks of railroad journals."—[Snow's Pathfinder Railway Guide].

"Makes a very handsome appearance and is full of valuable matter."—[Chicago Evening Post].

"An impartial and independent journal, valuable to every railroad man."—[Parkersburg (W. Va.) Times].

"Of great interest to railroad men, and almost equally so to those who use railroads."—[Marshall (Mich.) Statesman].

"It must prove a very valuable paper to stockholders and those who are interested in railroads."—[New York Globe].

"Every man who is at all interested in railroads would do well to take the GAZETTE."—[Jacksonville (Ill.) Independent].

"All who desire to keep themselves posted on the subjects connected with railroads will take it."—[Milwaukee Wisconsin].

"One of the best conducted and most interesting railway journals published in this country."—[New Haven Railway Courier].

"It will compare favorably with any similar publication, not only in New York or Boston, but in London or on the Continent."—[Waukegan (Ill.) Gazette].

THE RAILROAD GAZETTE.

A Weekly Journal of Transportation, Engineering and Railroad News.

Devoted to the Discussion of Subjects Connected with the Business of Transportation, and the Dissemination of Railroad News.

Illustrated Descriptions of Engineering Works and Railroad Machinery and Rolling Stock.

Contributions from Practical Railroad Men, on the Business of Railroading.

A Complete Record of Railroad News.

NEW ORGANIZATIONS.

PROGRESS OF NEW ROADS.

ELECTIONS AND APPOINTMENTS.

RAILROAD LAW.

The Cream of the American and European Technical Periodicals.

ENGINEERING AND MECHANICS.

TRAFFIC AND EARNINGS.

LAKE AND RIVER NAVIGATION.

RAILROAD MANUFACTURES.

An Impartial and Independent Journal, Valuable to Every Railroad Man.

TERMS OF SUBSCRIPTION:

Single copy, per annum, \$4.00 | Forty copies, per annum, and one to the person who gets up the club, \$100.00

Ten copies, per annum, \$5.00

ADVANCE PAYMENT is required.

CANADA SUBSCRIBERS, twenty-five cents additional.

SINGLE COPIES, ten cents each.

ADVERTISING RATES will be made known on application.

Address—

A. N. KELLOGG, Publisher,

101 Washington St., Chicago

"Has always been one of the best papers of the country for railroad intelligence."—[New York Commercial and Financial Chronicle].

"Has always been one of the most valuable publications in the West. . . . Is bound to continue its way as the leading railroad journal of the country."—[Sedalia (Mo.) Bazar].

"In its financial and commercial views in connection with the railroad interests of the country, may be regarded as one of the first papers of the United States."—[Pensacola Observer].

"As it devotes much attention to Southern railroad and industrial interests, it is always interesting to Southern readers."—[Galveston News].

"For railroad men and others wishing to keep themselves thoroughly posted on railroad matters we know of no better paper."—[Madison State Journal].

"One of our most valuable exchanges. . . . Its columns teem with reliable information of great benefit to railroad men of every section of the United States."—[Leavenworth Bulletin].

NOTICES OF THE PRESS.

"In every respect a worthy representative of the energetic and go-ahead city where it is published."—[Cincinnati Railroad Record].

"A most valuable thing to the engineer and all railway men, the capitalist, traveler, mechanic and general reader."—[Brooklyn (N. Y.) Argus].

"We know not where its equal can be found. . . . One of the most valuable journals in the country."—[Evansville (Wis.) Review].

"Full of information, scientific and general, with regard to railroads all over the country, their construction, operation, etc."—[Rochester Chronicle].

"This excellent weekly keeps its readers better posted as to what is going on in the railroad world than any other we have seen."—[Albany (Ga.) News].

"We consider it the most complete mirror of our railroad, shipping, monetary and other chief interests to be found in the country."—[Nebraska Register].

"A publication of great value to every one interested in railroads and railroading, and its scientific articles are of great value to every scholar."—[Oshkosh (Wis.) Northwestern].

"Emphatically a journal of transportation, and contains every conceivable item of news on the subject of railroads, steamboats, telegraphs, express companies, etc."—[Flint (Mich.) Globe].

"The news is very full, the discussions are conducted in a good temper and with excellent information. To judge from this first number, the conductors of the GAZETTE know what 'railroading' is, and what a proper weekly journal should be."—[New York World].

"A very neat publication in point of appearance, and, as it always has been, is now a reliable, interesting and accurate journal, ably edited in its various departments. . . . Our readers have wandered over its columns 'many a time and oft,' and always with gratifying results."—[Buffalo Commercial Advertiser].

"Has been for thirteen years a live, energetic railroad newspaper, and has fought its way up among its many competitors for the favor of the railroad public, gaining in strength and rising in importance year by year, until to-day it stands second to no journal of that important class in the United States."—[Peoria Daily Transcript].

"We have perused each succeeding number with great interest—its comprehensive information of railway matters, its sensible editorials, its able contributions and descriptions of new machines for railway use—and pronounce it by far the most progressive and valuable railway journal published in the United States."—[Pittsburgh Iron World and Manufacturer].

"We are glad of the opportunity of adding our cordial testimony to the great excellence of this periodical, which has certainly taken a first rank in the railroad literature of the modern world. Its writers have both information and experience; its extracts from foreign journals are selections of the best, while its news columns leave little to be desired by those who wish to be kept au courant with the location and construction of new lines and changes and improvements in the older organizations."—[United States Railroad and Mining Register].

JACOB R. SHIPHERD & S. Bury
155 and 157 LaSalle Street,
CHICAGO.

RAILWAY BANKERS
NEGOTIATE
MORTGAGE BONDS,
And Local Bonds Issued in Aid;
Make Advances; Complete Unfinished
Roads, etc., etc.

BLISS, TILLOTSON & CO.,
Manufacturers and Dealers in
TELEGRAPH MACHINERY,
—AND—
SUPPLIES
Of Every Description.

247 South Water Street,
CHICAGO, ILL.
L. G. TILLOTSON & CO., N. Y. G. H. BLISS, CHICAGO.

Established 1852.
CLEVELAND FILE WORKS
CLEVELAND, OHIO.
All descriptions of Files Manufactured and Recut. Also, dealers in Best English Cast Tool Steel. Orders solicited and satisfaction guaranteed.
JOHN PARKIN, Prop'r.

GIRARD
TUBE WORKS & IRON COMPANY.
PHILADELPHIA, PA.
Manufacture Plain and Galvanized WROUGHT IRON PIPE and Sundries for Gas and Steam Fitters, Plumbers, Machinists, Rolling Mills, Oil Refiners, &c.
WORKS—Twenty-Third and Filbert Streets.
OFFICE AND WAREHOUSE—No. 43 N. Fifth St.

NEWS DEALERS

Should Address Orders for

THE RAILROAD GAZETTE,

— TO —

The Western News Company,

CHICAGO.

ESTABLISHED 1890.

WM. J. YOUNG & SONS,

Successors to WM. J. YOUNG & CO., WM. J. YOUNG & SON, WM. J. YOUNG.

Mathematical and Engineering

Instrument Manufacturers,
At their old Location,
43 NORTH SEVENTH ST.,
Philadelphia,
Have so increased their facilities as to believe they can in the future keep a full supply of Instruments on hand.
Tapes, Chains, Stationery, Draughting Instruments and all supplies for field or office.

Lochiel Iron Co.,
HARRISBURG, PA.

Manufacturers of RAILROAD IRON AND SPLICE BARS.

W. T. HILDRUP, President.
V. N. SHAFFER, Gen'l Superintendent.

IRON BRIDGES, PIVOT BRIDGES
—AND—
Turn Tables.

F. C. LOWTHORP,
Civil Engineer, Patentee & Builder,
78 E. STATE STREET,
TRENTON, N. J.

F. E. Canda,
BRIDGE BUILDER

—AND—
GENERAL CONTRACTOR.
No. 2 S. Clark St.,
CHICAGO, - - ILLINOIS

AKRON CEMENT.

Union Akron Cement Company,
SOLE MANUFACTURERS.

OFFICE AND WAREHOUSE:
88 MARKET ST., CHICAGO.
20 Central Wharf, Buffalo.
Orders of Contractors, Railroads, and Bridge Builders, promptly filled.

ILLINOIS

Manufacturing Co.,

479, 481 & 483 STATE ST., CHICAGO,

Manufacturers of

RAILWAY CAR TRIMMINGS,

AND
Removable Globe Lanterns.
O. A. BOGUE, Pres. JAS. E. CROSS, Supt.
A. H. GUNN, Sec'y. J. M. A. DEW, Asst Supt.

HARRISBURG
CAR MANUFACTURING CO.,
Harrisburg, Pennsylvania,

MANUFACTURE
Passenger, Mail,
Baggage, Box,
Gondola, Coal,
AND ALL OTHER KINDS OF

RAILROAD CARS!

Railroad Car Wheels & Castings,
Bridge & Rolling Mill Castings,
Bridge Rods, Bolts,

RAILROAD FORGINGS!

W. T. HILDRUP, Superintendent.
WILLIAM COLDER, President.

HARRISBURG**Foundry and Machine Works!**

(Branch of Harrisburg Car Mfg Co.,)

Harrisburg, - - Pennsylvania.

MANUFACTURERS OF

MACHINISTS' TOOLS!

— SUCH AS —

LATHES, PLANERS,
Shaping and Slotting Machines,
Bolt Cutting & Nut Tapping Machines, &c.

W. T. HILDRUP, Treasurer.